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# **An estimation of the J-Curve effect between South Africa and the BRIC countries**

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degree of Master of Business Administration**

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## ABSTRACT

The type of exchange rate regime a country should adopt and ideal level of the currency have has been an ongoing debate amongst academics, politician and trade unionists. The South African economic debate is currently dominated by debates on the appropriate level of the exchange rate of the rand. With the high volatility of the rand and the rapid appreciation of the rand in 2010 there have been calls for various sectors for government to intervene and devalue the rand. The premise is that devaluation will help counter the volatility of the rand and help stimulate South Africa's export sector thereby resulting in an improvement of the trade balance.

The aim of this research was to determine if there is a relationship between South Africa's exchange rate and the trade balance and to determine if devaluation of the rand would have a positive influence on the trade balance. Furthermore the extent to which the trade balance would follow the J-Curve effect following devaluation was investigated.

Using the long term trade balance model and Autoregressive Distributed Lagged (ARDL) model between the analyses was done between South Africa and the BRIC countries. The conclusion reached was that a devaluation of the rand would not necessarily lead to a long term improvement of the trade balance and no evidence of the J-Curve effect was found.

## KEYWORDS

J-Curve Effect, Exchange Rate Regime, ARDL, Currency Devaluation, BRICSA

## DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I have obtained the necessary authorisation and consent to carry out this research.

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Sumesh Moodley

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Date:

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There are so many people that have inspired and supported me during this journey and for that I am truly grateful:

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## DEDICATION

*This research report is dedicated to my father Manikam Moodley  
who passed away on 13 September 2010,*

*I am because of you.....*

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## CHAPTER 1: INTRODUCTION TO THE RESEARCH PROBLEM

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### 1.1. Problem Description and Background

The exchange rate of a country is one of the important prices in an open economy, as it could affect business, investment and policy decisions (Liew, Limb & Hussain, 2002). A volatile exchange rate creates uncertainty in the real prices of goods and services.

Businesses impacted by exchange rate volatility could see their expected profits negatively affected due to increased costs in hedging against this risk (Bahmani-Oskooee & Hegerty, 2009). This would ultimately influence their decision to trade.

Exchange rate volatility increases uncertainty of profits on contracts denominated in a foreign currency as this would lead to risk averse and risk neutral agents redirecting their activity from higher risk foreign markets to lower risk home markets (Morales-Zumaquero and Égert, 2008).

The costliness of exchange rate interventions is one of the reasons why a number of central banks since 2000 including the South African Reserve Bank, opted against regular intervention in the foreign exchange markets (Knedlik, 2006).

According to Knedlik (2006), if exchange rate volatility increases dramatically it could evolve into a currency crisis which would result in a significant

depreciation of the domestic currency. At a macro level, a currency crisis could result in the instability of domestic price levels and could also lower the economic growth of a country (Knedlik, 2006).

Nandwa and Andoh (2008, p.2) are of the view that *“the collapse of the Bretton-Woods fixed exchange regimes in the 1970s, and its replacement by flexible exchange rates, introduced a world of uncertainties”*.

## **1.2. History of Bretton-Woods**

The Bretton-Woods system was established in New Hampshire in July 1944 (Judis, 2008). In order to create a more stable monetary system after the Great Depression and World War II, the United States (US) dollar replaced the British pound as the accepted global currency (Judis, 2008).

According to Bernhard and Leblang (1999), from the end of World War II until 1971, exchange rate systems were governed by the Bretton-Woods system (or the US dollar standard). Under this system, the US dollar served as the anchor currency of other countries.

This resulted in a new currency system in which the US Dollar was fixed at \$35 for an ounce of gold. The US dollar became the accepted medium of international exchange and a universal reserve currency (Judis, 2008). If countries accumulated more dollars than required they could exchange them with the United States for gold.

The Bretton-Woods system began to falter during the Vietnam War, when the United States spent billions of dollars to finance the war and ran both a trade and budget deficit (Judis, 2008). This resulted in inflationary pressure in the United States and countries began to swap the overvalued US dollars for deutschmarks while, France and Britain prepared to cash in their excess US dollars (Rossouw, 2007).

The United States responded by closing the gold window and demanded that Western Europe and Japan agree to new exchange rates, whereby the US dollar in terms of gold would be worth less (i.e. \$38 per ounce) and the yen and the deutschmark would be worth more relative to the US dollar. Effectively this implied a devaluation of approximately 8.6 percent in the value of the US dollar. This made U.S. exports cheaper and Japanese and West German imports more expensive, thereby easing the trade imbalance and stabilising the US dollar (Judis, 2008).

Rossouw (2007) states that during the 1960's, the United States attempted to reduce domestic unemployment by pursuing an inflationary monetary policy. This resulted in a trade deficit and an overvalued US dollar. The surplus countries refused to revalue their currencies and the Bretton-Woods system collapsed in 1971 (Bernhard and Leblang, 1999). Attempts to reinstitute the Bretton-Woods system failed and a system of floating exchange rates was introduced in 1973 (Rossouw, 2007).

According to Judis (2008) this resulted in countries revaluing their currencies and led to a new system; not based on fixed exchange rates, but instead the values of the currencies began to fluctuate.

Mishkin (2004) states that the Bretton-Woods system survived for 25 years despite the following shortcomings:

- countries experiencing difficulties in maintaining the value of their currencies against the US dollar owing to continued trade deficits were permitted to devalue their currencies, but those countries running consistent trade surpluses had no obligation to revalue their currencies
- the US dollar as the reserve currency could not be devalued even when the United States had continued trade deficits with the rest of the world.

Since 1973 exchange rates are in the main determined by forces of supply and demand, although a number of countries elect to fix their exchange rates, for example countries aiming to join the euro zone or countries comprising the common monetary area with Lesotho, Namibia and Swaziland whose currencies are pegged to the South African rand (Rossouw, 2007).

### **1.3. Impact of Exchange Rate Volatility on the Trade Balance**

The focus of the research is on exchange rate volatility and the impact a devaluation of the currency would have on the trade balance. A study by Redford (2008) concluded that exchange rate volatility affects exports and therefore the national income. More specifically, exchange rate volatility negatively affects the growth of exports, (Redford, 2008). A decrease in exports contributes to a widening trade deficit for a particular country.

Hacker and Hatemi (2004) believe that the reaction of the trade balance to exchange rate changes is important for two fundamental reasons:

- policy makers are concerned whether the trade balance is at an appropriate level for optimal trade
- trade balance fluctuations affect a country's national income in the short term.

Therefore knowing how the exchange rate changes affect the trade balance can help policy makers target national income.

According to a World Bank report (2005) on export competitiveness, exchange rates play a major role in determining the competitiveness of exports. The report found that real exchange rate overvaluation played an important role in the economic crisis of a number of developing countries.



Fluctuations in the exchange rate may reduce trade flows due to risk aversion by importers and exporters, but it could also lead to greater profits as they increase their trade volume to achieve a certain level of income (Bahmani-Oskooee and Hegerty, 2009).

Bahmani-Oskooee and Hegerty (2009) concluded that in respect of trade between the two countries, exchange rate volatility shows some significant short-term effects, but in the long-term the effects are somewhat weaker. Yusof (2009) contradicts this argument and states that the relationship between the exchange rate and trade balance is controversial since the effect is ambiguous.

Yusof (2009) further states that currency depreciation would theoretically encourage exports and discourage imports, thereby improving the trade balance, but found the statistical evidence to support this argument inconclusive.

The South African economic debate is currently dominated by debates on the appropriate level of the exchange rate of the rand. Trade unions believe that the current level of the rand vis-à-vis the currencies of the country's major trading partners does not only discourage exports, but also over encourages imports. This implies that domestic jobs are put in jeopardy. Trade unions in South Africa therefore clearly view the exchange rate as a policy tool to be used (perhaps even "manipulated") to encourage domestic job creation.

According to Reuters (2009), the Congress of South African Trade Unions (COSATU) has called for the rand to be devalued and stated the following, “*We are on a completely disastrous path ... We need a change. We need an exchange rate that will go back to 10 (against the dollar) for South Africa’s manufacturing sector to be given another breath of fresh air*”.

#### **1.4. Research Objectives**

Since the introduction of the euro and the collapse of fixed exchange rate regimes in several emerging markets, there has been a renewed interest in exchange rate regimes (Harms and Kretschmann, 2008).

A country could try to improve its trade balance and attempt to gain international competitiveness by devaluing its currency, although the impact of such a policy was not uniform across countries (Bahmani-Oskooee and Wang, 2008). This is the strategy currently supported by some South African trade unions, despite doubts about such a policy’s success.

The aim of this study is to determine if, as a mechanism to counter a volatile and high valued currency whether “*devaluing the South African rand would have a positive effect on the economy by reducing the trade deficit in the short and/or long run*”.

The main objectives of the research are:

**Objective 1:** to determine if a relationship exists between the exchange rate and the trade balance

**Objective 2:** to determine if a devalued exchange rate would improve South Africa's trade balance in the short and/or long run

**Objective 3:** to determine the extent at which South Africa would demonstrate the J-Curve effect if it devalued its currency

This study is motivated by the following factors affecting the South African economy:

- the volatility of the rand and the increasing pressure on policy makers to intervene to stabilise the rand
- the rapid appreciation of the rand and calls for the rand to be devalued
- the recent drive for South Africa to be included in the BRIC (Brazil, Russia, India and China) classification to become BRICSA

BMI (2005, p.3) writes that *“The volatility of the rand in recent years has played havoc with economic policy-making.”*

Ngandu (2006, p.29) notes in reference to the volatility of the rand that, “*there seems to be consensus that the currency is too volatile and that something should be done to address this volatility*”.

de Klerk (2009) observed that when the possibility of a pegged rand was mentioned by planning Minister Ebrahim Patel, “*the subsequent debate was so violent, sometime racist, that the need for a more stable currency was overshadowed*”.

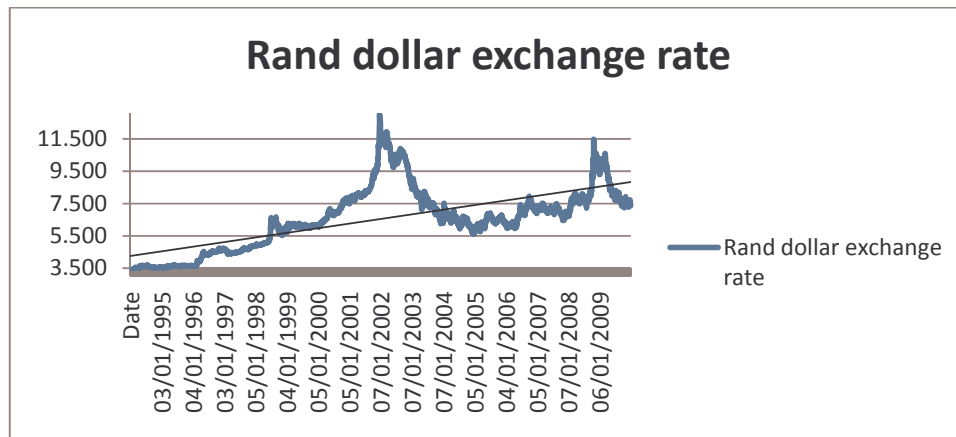
### **1.5. Context**

The context of this research is South Africa and the BRIC (Brazil, Russia, India and China) countries, and determining the effect of a devalued rand on South Africa’s trade balance against those countries.

According to Hodge (2005) the volatility and sustained strength of the rand have restricted growth particularly in the manufacturing export industry and exposes them to economic risk. He describes this risk as “*the risk that changes in exchange rates will affect the competitiveness and future profitability of a company*”.

In 2001 the rand depreciated from R7,60 to the dollar at the beginning of the year to a low of R13,84 in December, representing a depreciation of 82.1 percent as shown in figure 1 (LiPuma and Koelble, 2009).

Figure 1: Volatility of the rand since 1994



Source: adapted from South African Reserve Bank data

The depreciation troubled economists as the South African economy was improving during this period (LiPuma and Koelble, 2009). To date (and despite a Commission of Enquiry into the depreciation of the Rand) no real reason for the depreciation had been identified, (LiPuma and Koelble, 2009).

Figure 1 shows that in 2002 the rand depreciated to more than R11.50 to the dollar and BMI (2005) writes that in 2002 exporters welcomed the weakness of the rand, but the weakness resulted in inflation causing the South African Reserve Bank (SARB) to raise interest rates. As shown in figure 1 the rand strengthen in 2004 and BMI (2005) notes that this negatively impacted on exporters, as it eroded their international competitiveness and domestically importers gained market share.

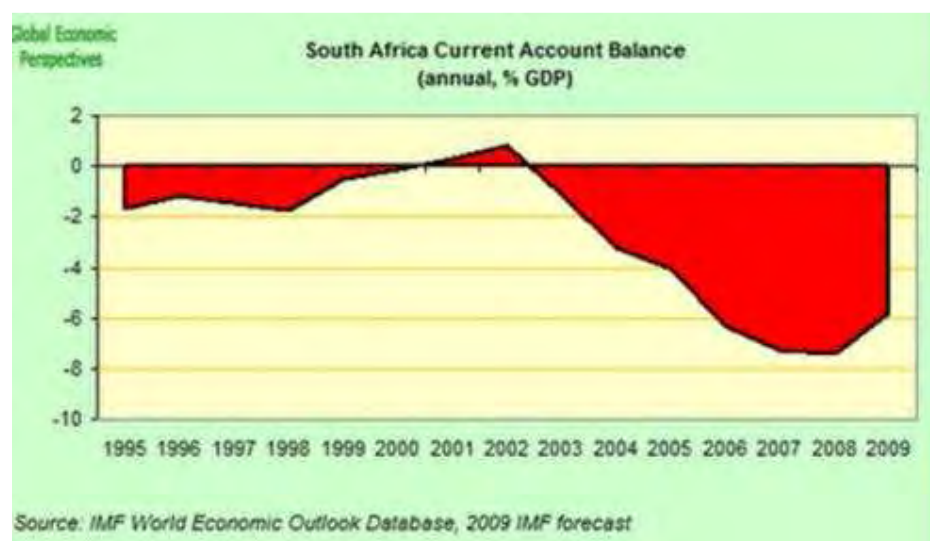
According to Duncan and Liu (2009), during 1996 and 1998 the SARB intervened heavily in the forward exchange market to support the value of the

rand. The policy of continuously defending the rand from market forces had the negative consequence whereby the SARB was forced to accumulate a very large net open forward position (NOFP) to the value of 23.2 billion US dollars (Duncan and Liu, 2009).

The high cost of defending the rand was regarded as the primary reason that the SARB changed its policy stance to inflation targeting effectively abandoned the policy of consistently intervening in the foreign exchange market (Duncan and Liu, 2009).

Figure 2 shows that since the end of 2002 until 2008 South Africa's trade deficit has been consistently widening as a percentage of GDP. The reduction of the trade balance since 2008 is attributed to the impact of the global financial crisis and the reduction of imports as opposed to exchange rate movements.

Figure 2: South Africa's widening trade deficit



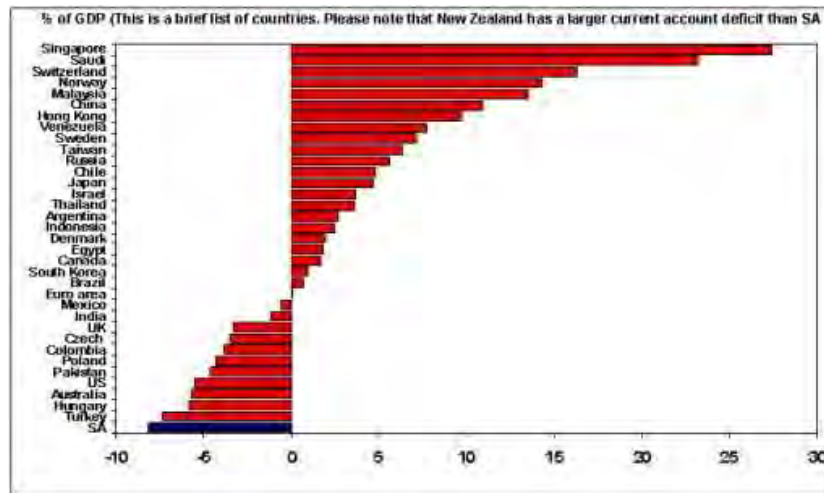
Almost half of South Africa's goods exports are destined for the US, Europe and Japan and as a result of the recession in the developed economies, South Africa's trade performance was severely impacted (Baeyens, 2009).

According to Baeyens (2009) the volume of goods exported from South Africa decreased by an annualised rate of 21 percent in the first three months of 2009, compared to the decrease of 6.3 percent in the fourth quarter of 2008. Relative to real gross domestic product, the value of goods exports dropped from 20.8 percent to 16.7 percent during the first quarter (Baeyens, 2009).

The contraction of the Chinese economy and the subsequent decline in demand for raw materials had a negative impact on South African mining products. This contributed to South Africa's widening trade deficit from R19,6 billion in the fourth quarter of 2008 to R53,4 billion in the first quarter of 2009. A trade deficit of similar magnitude was last recorded in the first quarter of 2008 as a result of the fact that the country experienced severe power outages (Baeyens, 2009).

Figure 3 shows that in 2008 South Africa had one of the worst trade deficits as a percentage of GDP against the major economies of the world. There is no indication that this situation will change in the near future.

Figure 3: South Africa's trade deficit against the world (2008)



Source: Lings (2008)

Finally a trade account deficit could also indicate that the demand side of the economy is expanding faster than the supply side. This imbalance between demand and supply can be seen as an early warning signal for demand-pull inflation (Steyn, 2004).

According to Gouws (2008) as cited by Mboweni (2008) the exchange rate of the rand is determined by millions of decisions taken daily by:

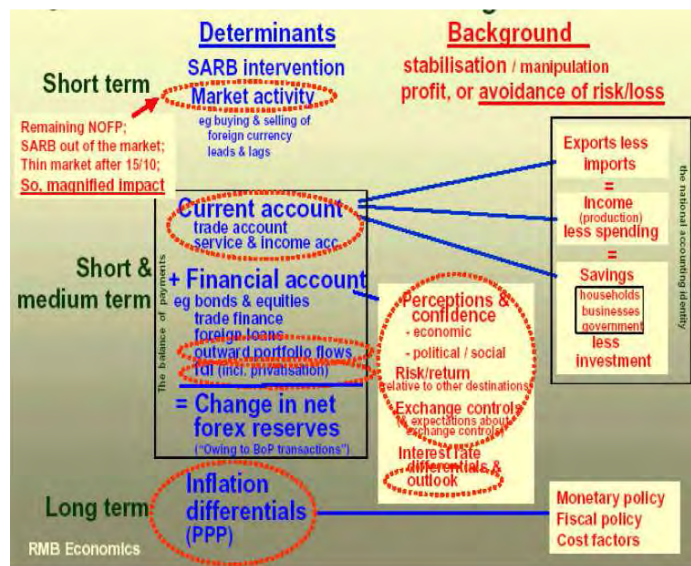
- South African consumers, corporates, foreign exchange dealers, institutional investors and various arms of Government; and
- foreign banks, foreign corporates, foreign institutional investors, foreign governments, multi-lateral institutions (such as the International Monetary



Fund and the World Bank) and foreign individuals such as tourists and consumers of South African products.

Mboweni (2008) further cited Gouws' (2008) framework in figure 4 below for exchange rates that highlight the factors that contribute towards determining the exchange rate.

Figure 4: Factors that impact the exchange rate



Source: Gouws (2008) as cited by Mboweni (2008)

Stučka (2004) states that in order to improve the trade balance, and influence a country's competitiveness authorities' could:

- focus on the internal approach relating to supply-side policies, such as influencing labour productivity or wages by, for example by curbing inflation, or decreasing or relaxing rigid labour market conditions.

- focus on the external approach such as devaluing the currency.

This research focuses on the later approach, by examining effect of a devalued rand on the trade balance.

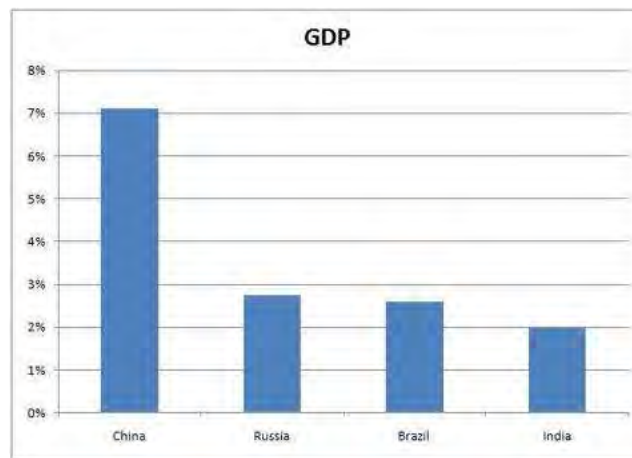
### **1.6. The rise of the BRIC nations**

In 2001 Goldman Sachs Chief Economist Jim O'Neill wrote a paper entitled "The World Needs Better Economic BRICs", thereby coining the term BRIC, an acronym for the fast growing economies of Brazil, Russia, India and China.

In 2009, the domestic demand growth in emerging markets, and in particular the BRICs, was one of the driving forces of an export-driven recovery in advanced economies (Yamakawa, Ahmed and Kelston, 2009).

From figure 5, it transpires that in 2009 China contributed 7.1 percent towards the world GDP, with Brazil and Russia contributing close to 2.5 percent. India is trailing after the other three BRIC countries with an estimated 2 percent contribution to world GDP (Jin, 2010).

Figure 5: BRIC contribution to world GDP 2009

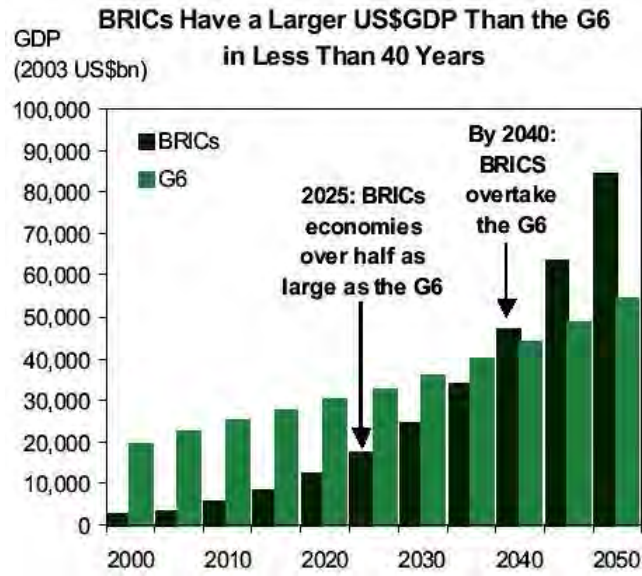


Source: Jin (2010)

The rise and sustained growth of the BRIC countries is not a bubble that is about to burst. O'Neill (2005) suggested that, if everything went right, then China could become the largest economy in the world by 2041 and India the third-largest by 2035.

Figure 6 illustrates that the BRIC economies are expected to grow to the point where the combined gross domestic product of the BRIC countries could exceed the combined GDP of the Group of Six (G6) countries being France, Germany, Italy, Japan, the United Kingdom and the United States by 2040 (O'Neill, 2005).

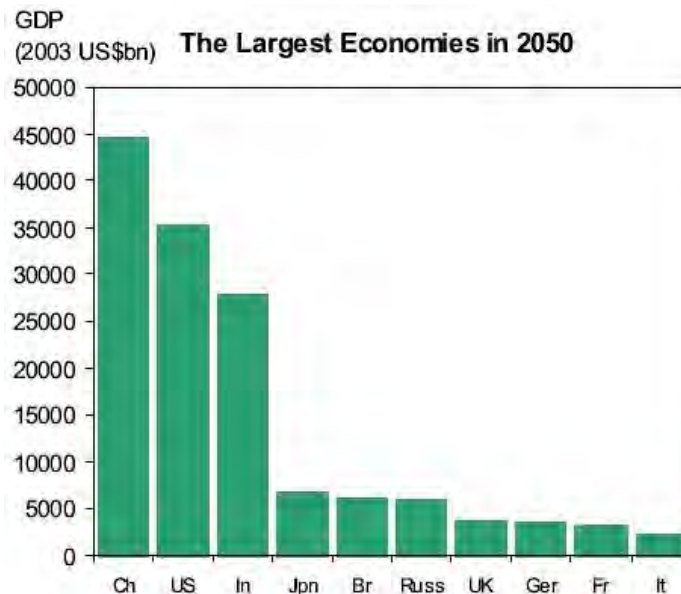
Figure 6: GDP growth predictions for BRIC



Source: Goldman Sachs (2010)

Finally by 2050, China is expected to be the largest economy in the world followed by the United States as depicted in figure 7 below.

Figure 7: World's largest economies in 2050



Source: Goldman Sachs (2010)

Figure 7 also indicates that of the current G6 countries, only the US and Japan may be among the six largest economies in US dollar terms in 2050 (O'Neill, 2010).

In 2005 O' Neill (2005) questioned whether the BRICs would survive. Clearly the above graphs and recent predictions not only confirm that they will survive, it also confirms that they will dominate the world economy. O' Neill (2005) also asked the question, who else might join them? If South Africa has its way, it hopes to be part of the BRIC phenomena.

### **1.7. South Africa's quest to form BRICSA**

2010 saw a major drive by South Africa's Head of State, President Jacob Zuma to join the BRIC group of countries to form BRICSA (or even BRICS). President Zuma visited all the BRIC countries in 2010 to rally support for this initiative. Success in this regard would help raise South Africa's political and economic influence to a global scale. According to Wong (2010), South Africa wants to be considered among the leaders of the developing world along with Brazil, Russia, India and China. Joining BRIC will also confirm South Africa's position as the leading economy on the African continent.

## 1.8. The 2010 Currency war

According to CNBC (2010), emerging countries such as the BRIC countries have seen strong economic growth and it could be desirable for them to maintain a strong currency in order to control their growth.

The Chinese yuan and other major global currencies represent what could be the early days of a trade battle as a result of the strength of the currencies of emerging markets which could spark what is becoming known as a currency war (CNBC, 2010).

According to CNBC (2010), there is potentially a global race in the developing world to devalue their currencies in response to the growth of the developing countries and the need to export driven economies to remain competitive.

According to ICTSD (2010), 2010 was the first time in six years that Japan intervened to manage the value of the yen by reducing the interest rate to zero. This was after the yen reached a 15 year high against the US dollar. The US Federal Reserve reacted by reducing the US interest rate according to the International Centre for Trade and Sustainable Development, (ICTSD, 2010).

China has been under increasing pressure from the US and European Union to allow the value of the yuan to appreciate echoing a belief that China was enjoying unfair trade advantage through its weak currency. The US has threatened China with tariffs if it does not allow the yuan to appreciate. China has retaliated by saying that this would be an example of the new world where

the United States embraced protectionism through legislation. They further stated that some US politicians were attempting to make the value of China's currency "a scapegoat for the American economic downturn" (ICTSD, 2010). According to ICTSD (2010) the Brazilian Finance Minister Guido Mantega was quoted as saying that the global economy is in an "*international currency war*".

## CHAPTER 2: LITERATURE REVIEW

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### 2.1 Introduction to the Literature Review

The literature reviewed in this section describes and examines the supporting theories that are related to the research problem. The theory reviewed in this section is broken down into four distinct themes viz:

- Classification and analysis of the different exchange rate regimes
- Understanding the relationship between the exchange rate and the trade balance
- Understanding the relationship between the exchange rate and inflation
- The J-Curve effect and its relevance to the trade balance

### 2.2 Classification of Exchange rate regimes

Schuler (2006) defines an exchange rate regime as the terms on which there is an exchange of domestic currency for foreign goods which includes currency, financial assets, and precious metals.

Exchange rate regimes can be classified according to either the publicly stated commitment of the central bank, i.e. a *de jure* classification, or the observed behaviour of the exchange rate, i.e. a *de facto* classification (Ghosh, Gulde, Ostry and Wolf, 1996).



According to Frenkel and Rapetti (2010) the exchange rate regime selected by a country could impact the following four key economic policy objectives:

- price stability
- domestic financial stability and robustness
- external and internal balances
- economic growth/development

Bleaney and Fransico (2005) identified the following exchange rate regimes:

- hard pegs (no separate legal tender; currency board, common monetary arrangement)
- soft pegs (peg to a single currency, peg to a composite of currencies, crawling pegs and bands)
- floats (managed floating, independently floating)

According to the Central Bank of Lesotho (2006), the following types of the exchange rate regimes exist:

### **Fixed exchange rate regime**

A fixed exchange rate regime is a commitment to a single fixed exchange rate quoted against an anchor currency or a basket of currencies, (Central Bank of Lesotho, 2006).

The government guarantees the exchange rate and defends the peg by way of holding adequate reserves of foreign currency. Under these circumstances, the

Central bank would need sufficient stock of foreign exchange reserves to support this system (Central Bank of Lesotho, 2006). If the country runs out of foreign reserves the fixed rate would be adjusted to a lower level, as the country would revert to a floating exchange rate regime.

### **Floating exchange rate**

A floating exchange rate regime is one where the exchange rate is determined by the forces of demand and supply. There is no direct intervention by the monetary authorities to influence the level of the exchange rate (Central Bank of Lesotho, 2006).

### **Managed float**

A managed float refers to a situation whereby monetary authorities define an exchange rate band above and below the determined exchange rate target. The monetary authority would intervene by buying or selling currency to maintain the exchange rate within this band, (Central Bank of Lesotho, 2006).

In July 2010 the Swiss National Bank (SNB) was expected to incur a loss of SFr10bn (€7,5bn) owing to interventions in the currency markets to restrain the value of the Swiss franc (deVere group, 2010). The SNB was concerned that a strong franc would hurt exports and attempted to limit an appreciation of the Swiss franc against the euro by buying euros (deVere group, 2010).

The SNB subsequently suspended its interventions, citing concerns about the deflationary risks of a rising Swiss franc to the domestic economy. However, outsiders saw the step as an acknowledgement that intervention in the currency market had failed (deVere group, 2010).

### **Crawling Peg**

Under a crawling peg regime, the exchange rate is fixed for a specific and relatively short period (Central Bank of Lesotho, 2006). The nominal exchange rate is changed periodically and remains fixed at the new rate until the next scheduled adjustment. The monetary authorities may or may not announce in advance when and by how much they will change the exchange rate (Central Bank of Lesotho, 2006).

A crawling peg could be used to peg the exchange rate in real terms. Such a system would take into account inflation differentials in exchange rate determination. Some observers view the exchange rate of Botswana as a crawling peg, based on inflation differentials.

The International Monetary Fund (IMF) (2006) uses the following classification scheme:

### **Exchange arrangements with no separate legal tender**

The currency of another country functions as the sole legal tender (formal dollarisation), or the country is a member of a monetary or currency union in which the same legal tender is shared by the members of the union. As a result

monetary authorities surrender control over domestic monetary policy (IMF, 2006). Examples of countries with this type of exchange rate regime include France and Germany.

### **Currency board arrangements**

According to the IMF (2006), this involves a commitment to exchange domestic currency for a specified foreign currency at a fixed exchange rate, combined with restrictions on the issuing authority to ensure the fulfilment of its legal obligation. This implies that domestic currency will be issued only against foreign exchange and that it remains fully backed by foreign assets. This leaves little scope for discretionary monetary policy and eliminates traditional central bank functions, such as monetary control and lender of last resort (IMF, 2006). Examples of countries with this type of exchange rate regime include Bosnia and Herzegovina and Hong Kong.

### **Conventional fixed peg arrangements**

According to the IMF (2006), a country's currency is pegged within a margin of  $\pm 1$  percent or less to another currency or a co-operative arrangement such as a basket of currencies. The basket is formed from the currencies of major trading or financial partners and the weights reflect the geographical distribution of trade, services, or capital flows. There is no commitment to keep the parity irrevocably.

The exchange rate may fluctuate within narrow margins of less than  $\pm 1$  percent around a central rate or the maximum and minimum value of the exchange rate may remain within a narrow margin of 2 percent for at least three months. The

monetary authority maintains the fixed parity through direct intervention (i.e., via sale/purchase of foreign exchange in the market) or indirect intervention (e.g., via the use of interest rate policy and imposition of foreign exchange regulations) (IMF, 2006).

Examples of countries with this type of exchange rate regime include China, while the Common Monetary Agreement (CMA) of South Africa is a special case of such an arrangement. Lesotho, Namibia and Swaziland have their currencies fixed at par to the South African rand allows no margin for movement around the fixed level. The rand also circulates freely in South Africa's three CMA partner countries.

### **Pegged exchange rates within horizontal bands**

According to the IMF (2006), the value of the currency is maintained within certain margins of fluctuation of more than  $\pm 1$  percent around a fixed central rate or the margin between the maximum and minimum value of the exchange rate exceeds 2 percent. As in the case of conventional fixed pegs, reference may be made to a single currency, a cooperative arrangement, or a currency composite. There is a limited degree of monetary policy discretion, depending on the band width.

Examples of countries with this type of exchange rate regime include Cyprus (prior to the adoption of the euro) and Denmark.

## **Crawling pegs**

The currency is adjusted periodically in small amounts at a fixed rate or in response to changes in selective quantitative indicators, such as past inflation differentials with major trading partners, differentials between the inflation target and expected inflation in major trading partners (IMF, 2006). Maintaining a crawling peg imposes constraints on monetary policy in a manner similar to a fixed peg system.

Examples of countries with this type of exchange rate regime include Botswana and Costa Rica.

## **Exchange rates within crawling bands**

According to the IMF (2006), the currency is maintained within certain fluctuation margins of at least 1 percent around a central rate or the margin between the maximum and minimum value of the exchange rate exceeds 2 percent and the central rate or margins are adjusted periodically at a fixed rate or in response to changes in selective quantitative indicators. The degree of exchange rate flexibility is a function of the band width. Bands are either symmetric around a crawling central parity or widen gradually with an asymmetric choice of the crawl of upper and lower bands (in the latter case, there may be no preannounced central rate). The commitment to maintain the exchange rate within the band imposes constraints on monetary policy, with the degree of policy independence being a function of the band width (IMF, 2006).

Examples of countries with this type of exchange rate regime include Mauritius.

### **Managed floating with no predetermined path for the exchange rate**

According to the IMF (2006), the monetary authority attempts to influence the exchange rate without having a specific exchange rate path or target. Indicators for managing the rate are broadly judgmental (e.g., balance of payments position, international reserves, parallel market developments), and adjustments may not be automatic. Intervention may be direct or indirect. Examples of countries with this type of exchange rate regime Russia and India.

### **Independently floating**

The exchange rate is market-determined, with any official foreign exchange market intervention aimed at moderating the rate of change and preventing undue fluctuations in the exchange rate, rather than at establishing a level for it (IMF, 2006).

The IMF classifies South Africa's exchange rate regime as an independent float. Other countries with a similar system include Australia, Brazil and Canada.

This above analysis shows considerable differences in the approaches used by BRIC countries and the expansion of BRIC to BRICSA will increase diversity.

It further shows that Brazil subscribes to an independently floating exchange rate regime, while Russia and India have a managed floating with no predetermined path for the exchange rate regime. China has a conventional fixed peg arrangement, while South Africa subscribes to an independently floating exchange rate regime.

This raises the question whether BRIC (or BRICSA) countries should over time align their exchange rate regimes.

### **2.3 Merits of each type of exchange rate regime**

The relative advantages of different exchange rate regimes have been the subject of ongoing discussions among policymakers and academics (Harms and Kretschmann, 2008).

According to the Central Bank Lesotho (2006) there are three important considerations that guide policy makers on which regime to adopt viz:

- **Monetary stability:** A highly volatile domestic money supply would require a floating exchange rate regime because the central bank would need independent tools to manage it so that it does not exert inflationary pressures in the economy.
- **The degree of openness of the domestic economy to the economy of the anchor currency is critical:** Relatively high volumes of trade between the home and anchor countries allow for a high degree of inflation pass-through to the home economy and favour a fixed exchange rate regime.
- **Welfare implications of such a regime:** If the degree of imported inflation is high, it destabilises prices in the home economy, and this results in welfare erosion in the home country.



According to Huang and Malhotra (2004) a fixed exchange rate regime can increase trade and output growth by reducing exchange rate uncertainty, but they also warn that it could reduce trade and growth by slowing the necessary relative price adjustment process.

In a study of twenty four Latin American and Caribbean economies, Krockow and Jurzyk (2004) found that the fixed exchange rate regime had a positive impact on bilateral trade and the longer the peg remained in place, the more it benefitted trade.

Confidence in a fixed peg and its potential trade creating effect can be undermined by a misalignment of the pegged rate or the threat of changing or abandoning the peg. Therefore a fixed exchange rate regime is only credible when it is supported by appropriate macroeconomic policies and not threatened by devaluation or regime change (Krockow and Jurzyk, 2004).

Mishkin (1998) states that the biggest disadvantage of a currency peg is that a country that has pegged its currency loses the ability to use monetary policy to respond to domestic shocks that are independent of those effecting the anchor country.

Regarding exchange rate devaluation, Liew, Lim and Hussain (2002) argue that *ceteris paribus*, the competitiveness of a company's exports would improve and therefore the competitiveness of the country. This leads to an increase in the firm's demand for labour and other inputs that go into the production process thereby having a positive effect on the economy.

This is beneficial for employment and ultimately economic growth, but could result in inflationary pressure. This was confirmed by a World Bank report (2005), which argues that devaluation improves competitiveness in the short term, but in the medium to long term the initial improvement in competitiveness would be eroded, by higher inflation that would result from devaluation, thus no permanent gain in competitiveness.

According to Frankel (2003) a floating exchange rate regime allows a country to pursue an independent monetary policy and allows the exchange rate to automatically adjust to developments and shocks in the economy. It also allows the central bank to remain as the lender of last resort.

Overvaluation, excessive volatility, and currency crashes are possible windfalls in this type of regime (Frankel, 2003).

## **2.4 The history of the BRIC exchange rate regimes**

### **2.4.1 Brazil's exchange rate regime**

According to Ka Fu (2000) the National Monetary Council (CMN) is responsible for formulating overall foreign exchange policy in Brazil while exchange control, foreign capital regulations, and the management of international reserves fall under the jurisdiction of the Central Bank of Brazil.

During 1967 to 1990 a crawling peg to the U.S. dollar was adopted (except for a short period of fixed exchange regime in 1986, in an unsuccessful attempt to deal with the rocketing prices). This philosophy, together with Brazil's foreign

debt burden, and fluctuations in the prices of its agricultural exports and oil imports, has put Brazil in a long history of inflation (Ka Fu, 2000).

Since 1990, a floating exchange rate regime (with minor government intervention) has been adopted. However, this regime was subject to an adjustable band from 1995-1999 in a program to control money creation. During this period of time, inflation was still a problem (Ka Fu, 2000).

In 1999 Brazil was involved in a currency crisis, as a result from the 1997 Asian crisis and the 1998 Russian crisis. Following this crisis an independently floating exchange rate regime was adopted (Ka Fu, 2000).

#### **2.4.2 Russia's exchange rate regime**

The currency of Russia is the ruble. According to Araki (2001) Russia made the transition to a market economy in 1992 and thus began the liberalisation of prices and the ruble began to trade at current market rates. By the end of 1992 consumer prices in Russia increased by 25.1 times and as a result the Russian government adopted a policy of maintaining the ruble's exchange rate at a high level to contain inflation (Araki, 2001).

On Black Tuesday (11 October 1994), the ruble plunged 27.5 percent to 3,929 to the dollar from 3,081 to the US dollar the previous day. The plunges in 1993 and 1994 meant that it was difficult to keep the ruble's value at a stable or constant level and to avoid further plunges the Russian government switched to

a policy of moderately depreciating the ruble's exchange rate to the US dollar (Araki, 2001).

In 1998, the Russian government adopted a policy to fix the ruble's exchange rate at 6.2 rubles to the dollar. The purpose of this policy was to put price stability firmly in place based on the actual decline in the inflation rate (Araki, 2001).

According to Araki (2001), Russia managed to weather the wave of the sale of rubles by drastically raising interest rates in May 1998. However by August 1998 a currency crisis had again developed and the Russian government announced measures to cope with the crisis, which included a 32.8 percent devaluation of the ruble. Despite these steps the massive selling of rubles continued. The Russian government was unable to cope with the momentum of selling rubles and was compelled to move to a floating exchange rate system (Araki, 2001).

### **2.4.3 India's exchange rate regime**

The currency of the Republic of India is the rupee. During the period 1950 until mid-December 1973, India followed a fixed exchange rate regime where the rupee was fixed to the pound sterling with subsequent devaluations in 1966 and 1971 (Ka Fu, 2000). When the pound sterling was floated in 1972, the rupee's link to the British pound was maintained; paralleling the pound's depreciation and effecting a *de facto* devaluation (Ka Fu, 2000).

In 1975, India abandoned the fix to the pound sterling and adopted a managed floating exchange regime. The effective rate of the rupee was controlled on a floating basis and linked to a basket of currencies based on India's major trading partners (Ka Fu, 2000).

In early the 1990s, the managed floating exchange rate regime came under severe pressure due to India's widening trade deficit which led the Reserve Bank of India (RBI) to downward adjust the value of the rupee. In 1992 India introduced the Liberalised Exchange Rate Management System (LERMS) and adopted a dual exchange rate (an official rate as well as a market determined rate) (Ka Fu, 2000).

In March 1993, the LERMS was replaced by the unified exchange rate system and the system of market determined exchange rate was adopted. However, the RBI did not relinquish its right to intervene in the market to enable orderly control (Ka Fu, 2000).

#### **2.4.4 China's exchange rate regime**

The renminbi meaning "Peoples Currency" is the official name of the Chinese currency and was introduced by the Communist People's Republic of China in 1949 (Mulvey, 2010). The yuan is the name of a unit of the renminbi currency. According to Mulvey (2010) something may cost one yuan or 10 yuan but it would not be correct to say that it cost 10 renminbi.

According to Ka Fu (2000) upon its establishment the renminbi was fixed to the U.S. dollar and was periodically adjusted due to the fluctuations of the US dollar. From early 1970s, China began to list an effective rate, which was later pegged to a trade-weighted basket of 15 currencies, for foreign exchange transactions (Ka Fu, 2000).

In the early 1980's a multiple rate structure, which contained a different exchange rate for trade-related foreign transaction was established but was abolished 5 years later with the effective rate governing all trade.

The effective rate was later placed on a controlled float based on developments in the balance of payments and in costs and exchange rates of China's major competitors (Ka Fu, 2000).

As a result of the development of the foreign exchange market and increase in foreign exchange, China created a Foreign Exchange Swap Rate for foreign investment corporations and Chinese enterprises under the foreign exchange retention regime (Ka Fu, 2000).

In the 1990's, the China authorities worked towards putting the exchange rate regime on more market-oriented basis. Since 1994, China has been maintaining a controlled float foreign exchange regime under which the effective rate was replaced by the prevailing swap market rate (Ka Fu, 2000).

## 2.5 The history of South Africa's Exchange rate regime

According to Karoro, Aziakpono and Cattaneo (2008), after the collapse of the Bretton-Woods system, from 1971 to 1979, efforts were made to re-establish the stability of the exchange rate of the South African rand. In 1977 the De Kock Commission of Inquiry was appointed to investigate South Africa's monetary system (Karoro, Aziakpono and Cattaneo, 2008).

In 1979 the commission found that the exchange rate system had serious deficiencies. Based on the findings of the commission the peg of the rand to the US dollar was officially ended and a system of a managed floating exchange rate was introduced (Karoro, Aziakpono and Cattaneo, 2008). The De Kock Commission also recommended that the SARB intervene to keep the rand stable by buying and selling foreign currency.

A dual exchange rate system consisting of a commercial rand (ZAR) and a financial rand (ZAL) was introduced in an attempt to discourage large outflows of foreign currency. The commercial rand applied to all current transactions, while the financial rand applied to capital flows of non-residents in respect of their domestic investment and disinvestment. The financial rand traded at a discount to the commercial rand.

South Africa entered the floating exchange rate era with a dual exchange rate system, coupled with additional measures to protect the external value of the rand du Toit, (2005) as cited in (Karoro, Aziakpono and Cattaneo, 2008) .

Karoro, Aziakpono and Cattaneo, (2008) further state that the rand remained fairly stable until 1983 when a number of factors led to the depreciation of the rand. These factors included a drop in the gold price, substantial capital outflows following increased political instability and United Nations sanctions which ultimately culminated in an immediate stand-still of foreign debt repayments in 1985.

The SARB was forced to revert to tighter foreign exchange controls. The financial rand which was abolished in 1983 was re-introduced in 1985 for foreigners who wanted to repatriate capital out of the country. The dual exchange rate system was retained until its abolishment in March 1995.

The policy of a market-determined rand and the relaxation of exchange controls have exposed the currency to domestic and external shocks, consequently increasing its volatility (Karoro, Aziakpono and Cattaneo, 2008).

## **2.6 Exchange Rate and trade balance relationship**

Conventional wisdom states that exchange rate depreciation would improve the trade balance in the long run, but it could cause a worsening in the short run (Yol and Baharumshah, 2007). Thus a change in the exchange rate has two effects on the trade balance, i.e. the price effect and the volume effect

However, Liew, Lim and Hussain (2002) state that while there is a theoretical relationship between the exchange rate and the trade balance, the relationship is somewhat ambiguous.



Consequently there is no unanimity in the existing literature pertaining to the relationship between the exchange rate and trade balance. However, an accurate understanding of the trade balance response to a change in exchange rate is crucial in determining monetary, fiscal and exchange rate policy (Yol and Baharumshah, 2007).

Rincón (1998) believes that the relationship between trade balance and exchange rates is especially important for many developing economies where trade flows drive balance of payments accounts due to their low development of capital markets.

According to Stučka (2004) it is important to quantify the short-run and long-run responsiveness of the trade balance to exchange rates as it:

- establishes whether there is a long-run relationship between the exchange rate and the trade balance
- helps to determine if currency depreciation would lead to a net improvement of the trade balance in the long-run
- assists in quantifying the extent of the trade balance improvement against the cost of permanent currency depreciation

- estimates the short and medium-run impact of exchange rate changes on the trade balance and helps to determine whether depreciation would have an adverse short-run impact on the trade balance

Stučka (2004) observes that the responsiveness could assist policy makers to determine the appropriateness of central bank intervention with respect to an alternative such as the crawling peg exchange rate regime or its ability to support a permanent depreciation of the domestic currency.

According to Liew, Lim and Hussain (2002) the trade balance is determined by the demand for domestic goods relative to foreign goods, and these demands are dependent on relative prices and the comparison of foreign prices to domestic prices.

Yol and Baharumshah (2007) state that an exchange rate depreciation would make imports more expensive and causes domestic exports to be cheaper for foreign buyers. This is known as the price effect.

Liew, Limb and Hussain (2002) support this view and believe that depreciating a currency increases exports by making exports relatively cheaper, and discourage imports by making imports relatively more expensive, thus improving trade balance.

Georgopoulos (2008) states that a textbook view of the exchange rate/trade balance/ relationship is that imports become relatively more expensive after

domestic currency depreciation. This leads to a reduction in imports, while foreigners will purchase more domestic exports as they are relatively cheaper. Georgopoulos (2008) criticises this textbook view, as it overlooked the degree to which exporters pass through exchange rate movements into the local prices and overlooked the degree that trade volumes respond to the exchange rate.

In a study of Columbia, Rincón (1998) concluded that exchange rates did play a role in determining the short-and-long equilibrium behaviour of the trade balance therefore could not be treated as exogenous with respect to the exchange rates.

## **2.7 Currency Devaluation**

Bahmani-Oskooee, Goswami and Talukar (2005) states that in an attempt to gain international competitiveness and improve the trade balance, a country could devalue its currency.

Mohammed (2001) as cited in Esquivel and Felipe (2002), states that currency devaluation would encourage exports and discourage imports and therefore can be used as an effective means of trade balance adjustment. However, the statistical evidence on this issue is inconclusive.

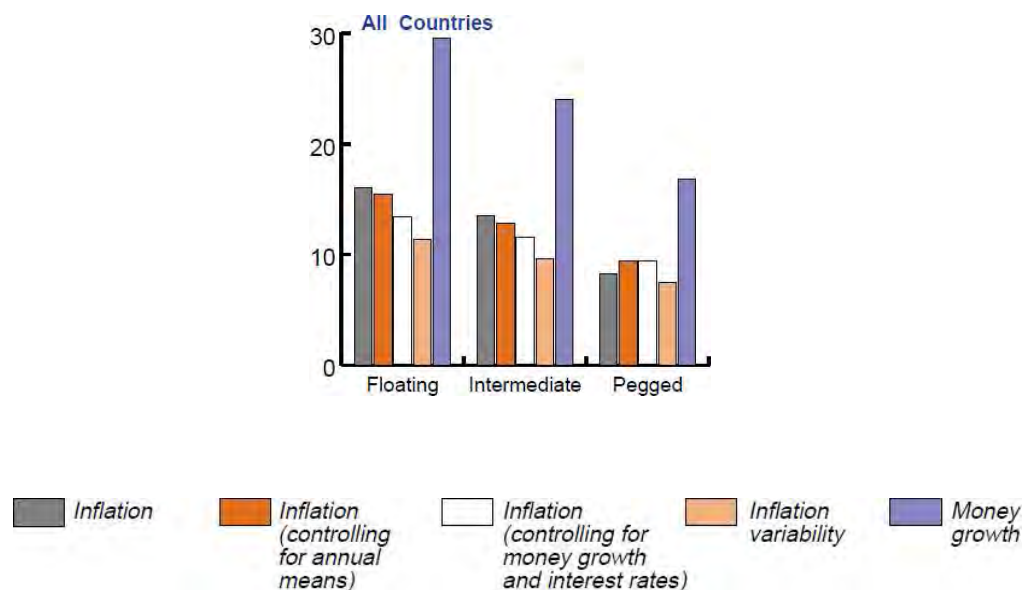
Devaluation of the domestic currency would make foreign goods expensive relative to domestic goods and therefore consumers will substitute domestic goods for foreign goods (Yusoff, 2009). This tends to reduce the volume of imports. The net impact of the depreciated exchange rate change on the trade

balance is not clear since depreciation also increases the cost of imports in terms of domestic goods which might not offset the increase in export income and could result in a trade deficit (Yusoff, 2009).

## 2.8 Exchange rate regime and inflation

In a study on inflation, between 1960 – 1990 Ghosh, Gulde, Ostry and Wolf (1996) found that countries with pegged exchange rates had an average annual inflation rate of 8 percent, compared with inflation of 14 percent for intermediate regimes, and 16 percent for floating regimes as highlighted in figure 8.

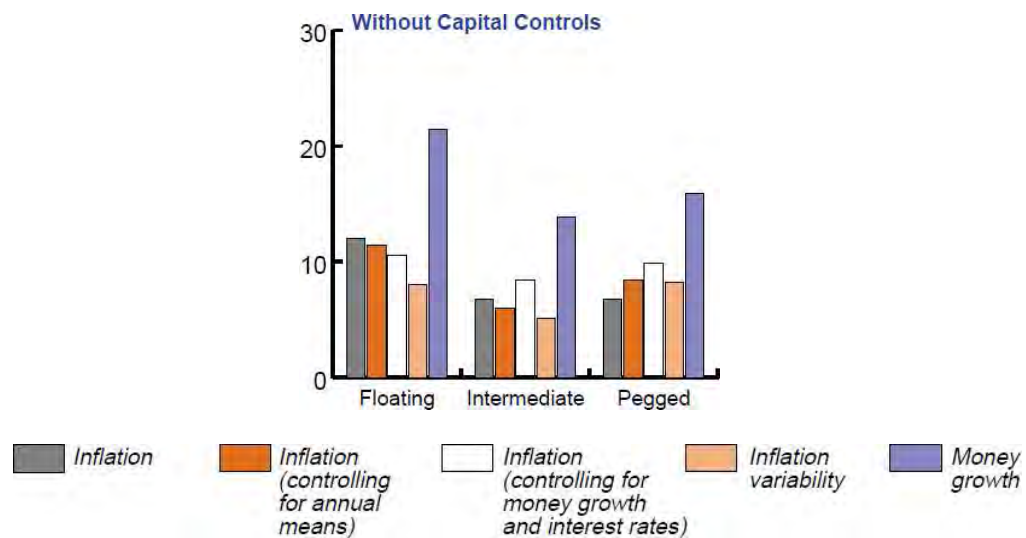
Figure 8: Inflation performance with Capital Controls



Source: Ghosh, Gulde, Ostry and Wolf (1996)

Using figure 9 Ghosh *et al.* (1996) found that countries with fixed exchange rates tend to have lower inflation levels, while countries without capital controls tend to have lower inflation.

Figure 9: Inflation rate without capital control



Source: Ghosh, Ostry and Wolf (1996)

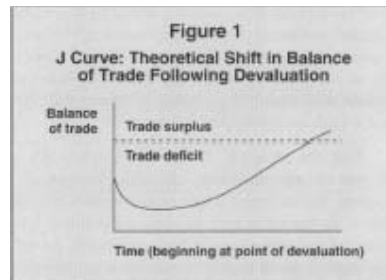
Ghosh *et al.* (1996) concluded that regarding the choice of the exchange rate regime and inflation suggest that countries with low inflation have a greater tendency towards pegged exchange rates. Alternatively, it is possible to conclude that pegged exchange rate regimes introduce additional monetary policy constraints that result in lower inflation.

## 2.9 The J-Curve effect

According to Hooy and Chan (2008), the J-curve effect would occur when a country depreciated its currency; the initial effect is that the trade balance would worsen, but over time consumers and producers adjust to the change in real

prices of goods and as a result the trade balance improves as shown in figure10.

Figure 10: The J-Curve effect



Source: Hooy and Chan (2008)

The J-curve effect is also referred to as the hockey-stick effect.

Akbostanci (2004) explained the J-Curve effect by highlighting that initially the volume of imports and exports would not change much since those trade contracts were negotiated several months in advance. The real depreciation would make the predetermined level of imports more costly in the local currency and thus the value of imports will rise while the value of exports will not change much which will worsen the trade balance immediately after the real depreciation. As time passes, both producers and consumers will be more responsive, and quantities start to adjust to the change in the relative price of domestic goods, and hence, the trade balance starts to improve (Akbostanci, 2004).

Junz and Rhomberg (1973) as cited in Hacker and Hatemi (2004) list the following reasons for the slow response of export and import quantities when a currency is devalued:

- recognition lag: a lag in the market's awareness of changed competitive conditions.
- decision lag: a lag in establishing new orders and business connections.
- delivery lag: a lag in old-order payments (based on old prices) until delivery.
- replacement lag: a lag in replacing out-dated equipment or used inventories
- production lag: a lag in modifying supply capacities and supply patterns, due to the time needed to persuade suppliers that the changed conditions are adequate in size and permanence to justify the modifications.

In a study of Turkey, Akbostanci (2004) confirmed a relationship between the exchange rate and the trade balance, but did not find any evidence supporting the J-Curve effect. Rather Akbostanci (2004) found evidence of a cyclical pattern of the response of the trade balance to a real depreciation of the currency.

In a study of Japan and its trading partners, Bahmani-Oskooee and Goswami (2003) as cited in Bahmani-Oskooee and Ratha (2004) found conclusive evidence of the J-Curve in the long and short run as did Hacker and Hatemi (2003), also cited in Bahmani-Oskooee and Ratha (2004).

Akbostanci (2004) states that to test for the J-Curve, a country should have a fairly balanced trade level, and in the short run elasticity's should be sufficiently low, and in the long-run elasticity's should be sufficiently high, or in the long run the Marshall-Lerner condition holds.

The Marshall-Lerner condition states that, starting from a position of equilibrium in the current account; a depreciation of the domestic currency improves the current account only as long as the sum of the elasticities of foreign demand for exports and domestic demand for imports exceeds unity (Yol and Baharumshah, 2007). If the sum of the elasticity's is less than unity then currency devaluation will worsen the current account balance.

Yusoff (2009) states that it is possible that the Marshall-Lerner condition may not be satisfied in the short-run due to factors such as the tastes and preferences of the consumers. Goods are differentiated by brand names, designs, and after-sale services and consumers may be loyal to these products and may not switch to another brand in the short-run, even though they are relatively cheaper (Yusoff, 2009). The producers also may not be able to produce and satisfy the orders as quickly after devaluation because it takes time to expand the plant sizes and to buy the equipment and raw-materials (Yusoff, 2009).



## 2.10 Conclusion

While considerable research has been done (as outlined above) to understand the exchange rate/trade balance relationship, the research results are mixed and cannot be applied as a rule across countries.

At best they can be described as country and research method specific. None of the researchers have been able to identify a common thread as to when a relationship would exist between the trade balance and exchange trade nor the existence of the J-Curve effect.

## CHAPTER 3: RESEARCH PROPOSITIONS

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### 3.1 Purpose of Research

The main purpose of this study is to determine the relationship between the exchange rate regime and the trade balance by focusing on South Africa and the BRIC countries. The research aims to determine whether devaluing the rand would have a positive effect on the South African economy by reducing the trade deficit. The research also considers the expansion of BRIC to BRICSA. Recommendations for monetary policy will be made in Chapter 7, based on the research findings.

### 3.2 Research Question

The fundamental question that this research aims to answer is, *“Will a real devaluation of the South African rand have a positive effect on the economy by reducing the trade deficit in either the short and/or long run?”*

### 3.3 Research Propositions

**Proposition 1: There is a direct relationship between the exchange rate of the rand and the trade balance, i.e. a change in the exchange rate will have a direct impact on the trade balance.**

Akbostanci (2004) states that the impact of exchange rate policy on the trade balance is generally not clear as the nominal exchange rate is not the only variable that influences the real effective exchange rate.

**Proposition 2: A real devaluation of the rand will improve South Africa's trade balance**

Musila and Newark (2003) state that one of the reasons why governments are reluctant to devalue their currency is fear of a negative impact on the balance of payments, as the perceived improvement in exports may not outweigh the inflationary effect on imports.

According to LiPuma and Koelble (2009), when the rand depreciated drastically in 2001, inflation set in due to the rise in the price of imports. This resulted in the South African Reserve Bank raising interest rates to slow down inflation.

**Proposition 3: By devaluing the rand, the South African trade balance will reflect the J-Curve effect**

Akbostanci (2004) states that there is popular belief that the relationship between the real exchange rate and the trade balance has different effects in the short-run and the long-run. It is believed that following a real depreciation of the currency the trade balance will initially worsen, but will improve over time generating a tilted J-shape.

## CHAPTER 4: RESEARCH METHODOLOGY

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### 4.1 Choice of Methodology

The research design was quantitative and descriptive in nature. Zikmund (2003) explains that the major purpose of descriptive research is to describe characteristics of a population or phenomenon. This study aimed to determine whether a relationship exists between the exchange rate and the trade balance in the short and long term and the impact thereof. According to Zikmund (2003) descriptive studies are conducted based on some previous understanding of the research problem.

The study considered whether devaluing the rand would have a positive effect on the South African economy. Therefore a quantitative, descriptive research design was suitable for this study.

The approach used adapted a study done by Bahmani-Oskooee, Goswami and Talukar (2005) who tested for the J-Curve between Australia and 23 of its trading partners.

### 4.2 Unit of Analysis

Based on the stated propositions in chapter 3, the unit of analysis selected was South Africa.

### **4.3 Population**

The population consisted of all countries that maintained bilateral trading relationships with South Africa since 1994.

### **4.4 Sampling Method & Size**

A non-probability sampling technique was used, which was described by Zikmund (2003) as a sampling technique in which units of the sample are selected on the basis of personal judgement or convenience.

For the purpose of this research judgement sampling was used. Zikmund (2003) states that by using judgement sampling, the sample is based on the researchers' judgement about the appropriate characteristics required of the sample members.

The impact of the BRIC countries on the world economy cannot be underestimated and South Africa is on a drive to be included in the BRIC group of countries (although no time and date has been attached to such a possibility).

According to Wong (2010), South Africa wants to be considered among the leaders of the developing world along with Brazil, Russia, India and China. Joining BRIC will also confirm South Africa's position as the leading economy on the African continent. Therefore the BRIC countries were selected as the sample for this study.

The analysis was done in terms of trade volumes and exchange rate data between South Africa and the BRIC countries for the period of 1994 - 2009.

The year 1994 was selected as the commencement date as it is regarded as the start of South Africa's democracy and 15 years worth of data is considered to be sufficient. Moreover free trade between South Africa and the BRIC countries started from only 1994 rendering data before 1994 of less value for research purposes.

## **4.5 Data Gathering and Research Instrument**

### **4.5.1 Data Gathering**

The International Monetary Fund (2010) website (specifically the International Financial Statistics Online section) was used as the source for consumer price index (CPI) and exchange rate data for the BRIC countries.

South Africa's trade balance and trade volume data with BRIC was obtained from the South African Trade Statistics section of the Department of Trade and Industry's Website (DTI, 2010).

South Africa's exchange rate history was sourced directly from the Bloomberg system which was available to the researcher.

## 4.6 Data Analysis

### 4.6.1 Proposition 1 & 2: Long Term Trade Balance Model

Equation 1 shows the long run trade balance model used by Bahmani-Oskooee, Goswami and Talukar (2005).

$$\text{Log}TB_t = \alpha + \beta \text{Log}Y_{a,t} + \gamma \text{Log}Y_{it} + \lambda \text{Log}REX_t + \varepsilon_t \dots\dots\dots(1)$$

#### Variables used

TB - Trade Balance

$Y_a$  - South Africa's income

$Y_i$  - income of the trading partner (i.e. the BRIC countries)

REX – real exchange rate

According to Bahmani-Oskooee, Goswami and Talukar (2005) this model is regarded as unit free and can be used to measure the trade balance in real or nominal terms.

The model assumes that the trade balance has a positive association with South Africa's income ( $Y_a$ ) and a negative association with the income of the trading partner ( $Y_i$ ). This is based on the premise that an increase in South Africa's income is expected to stimulate the imports from the trading partners and an increase in trading partner's income is expected to increase exports to that trading partner. Therefore a relationship between the exchange rate and trade balance is inferred by the estimate of  $\beta$  which will be positive and the estimate of  $\gamma$  which will be negative.

For proposition 2, a real depreciation of the South African rand against the currency of a trading partner, i.e. a decrease in REX is expected to improve South Africa's trade balance with that partner, therefore the estimate of  $\lambda$  is expected to be positive.

#### 4.6.2 Proposition 3: Autoregressive Distributed Lagged (ARDL)

The Autoregressive Distributed Lagged (ARDL) model (equation 2) as used by Bahmani-Oskooee, Goswami and Talukdar (2005) is used to test for the J-curve effect.

$$\begin{aligned} \Delta \text{Log}TB_t = & \alpha + \sum_{k=1}^n \omega_k \Delta \text{Log}TB_{t-k} + \sum_{k=0}^n \beta_k \Delta \text{Log}Y_{a,t-k} + \sum_{k=0}^n \gamma_k \Delta \text{Log}Y_{i,t-k} \\ & + \sum_{k=0}^n \lambda_k \Delta \text{Log}REX_{j,t-k} + \delta_1 \text{Log}TB_{t-1} + \delta_2 \text{Log}Y_{a,t-1} + \delta_3 \text{Log}Y_{i,t-1} + \delta_4 \text{Log}REX_{j,t-1} + u_t. \end{aligned} \quad \dots(2)$$

##### Variables used

TB - Trade Balance

$Y_a$  - South Africa's income

$Y_j$  - income of the trading partner (i.e. the BRIC countries)

REX – real exchange rate

Cointegration amongst the variables must first be established. This is done by carrying out an F-test and if the calculated F-test is greater than the critical value of 4.01 the variables are retained and are said to be cointegrated.



Once cointegration has been established the J-curve effect is inferred by checking the subsequent lags and checking the sign and size of the sign and size of estimates of  $\lambda$ .

#### 4.7 Research Limitations

- Political instability: Political instability, civil wars and major political regime changes are common in African countries. These events could have had implications on their trade and this could skew the data
- Major political events: South Africa's transition to democracy has brought about major economic changes. It might be difficult to distinguish between changes in the level of trade as a result of South Africa being welcomed into the international area versus economic policy.
- Uncontrollable factors such as the financial crisis: The recent financial crisis has had a major impact on the world. There has been increased protectionism in the emerged economies, which have a rolling impact on the emerging economies.
- Equations 1 and 2 do not factor in the potential effect import/export incentives implemented by any of the countries.
- The impact of the reduction of South Africa's trade tariffs in 1996/7 was not taken into account.

- Potential countermeasures that could be taken by the BRIC countries as a result of a potential devaluation of the rand have not been factored into the analysis.

## CHAPTER 5: RESULTS

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### 5.1 Introduction to Results

Chapter 5 presents the data collected and the results of the econometric analysis conducted for the period quarter one 1994 to quarter four 2009.

The objective of this research was to determine if a relationship exists between the South African rand exchange rate and the trade balance and to estimate the J-Curve effect should South Africa decide to devalue the rand.

The analysis was conducted between South Africa and the BRIC countries using bilateral trade data and exchange rate information between South Africa and these countries.

Following the approach of Bahmani-Oskooee, Goswami and Talukar (2005), the Akaike Information Criterion (AIC) was used to automatically select the optimum lag length. According to Asghar and Abid (2007) estimating the lag length of an autoregressive model is one of the most difficult aspects of econometric modelling with time series data. Khim-Sen and Liew (2004) state that the optimal lag length is never actually known and has to be estimated using a lag length selection criteria. Therefore based on Bahmani-Oskooee, Goswami and Talukar (2005) the Akaike Information Criterion was used to automatically select the optimum lag length.

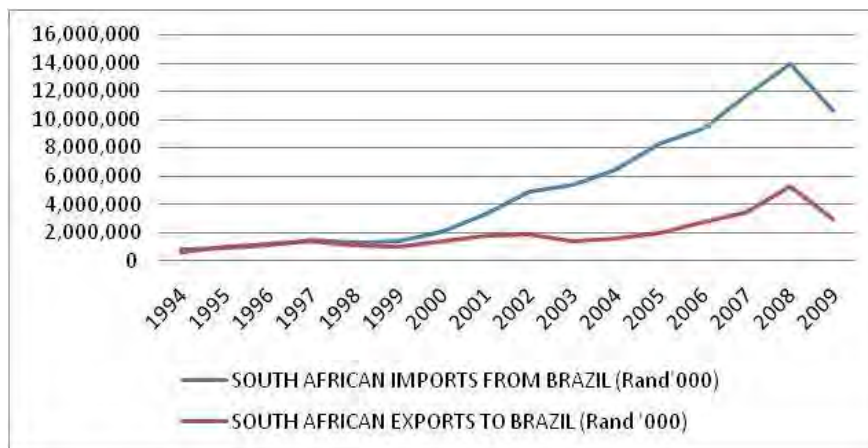
The econometric analysis was done using the Microfit for Time Series Econometrics software version 5.02.

The output of the long term trade balance model (equation 1) and ARDL model (equation 2) is presented below. The analysis of the results will be presented in chapter 6.

## 5.2 Bilateral trade profile between South Africa and BRIC

### 5.2.1 Brazil's trade profile with South Africa

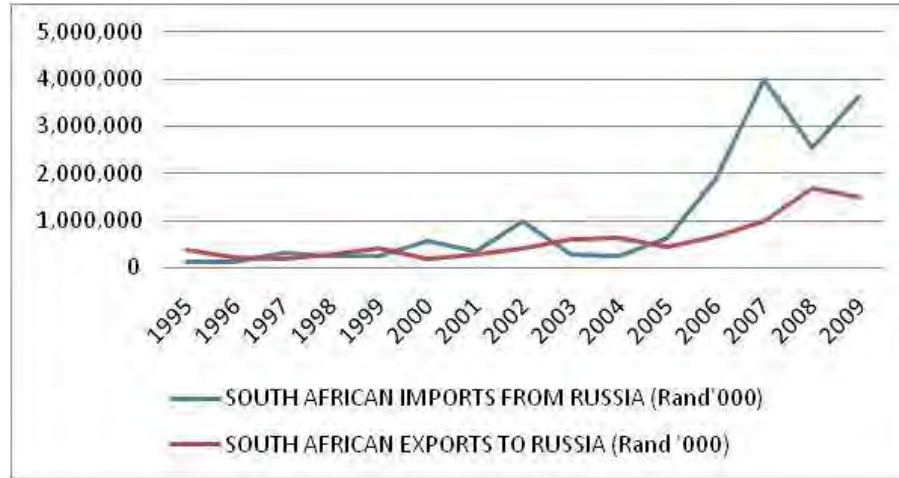
Figure 11: Bilateral trade flow between South Africa and Brazil



Source: adapted from South African Reserve Bank data

### 5.2.2 Russia's trade profile with South Africa

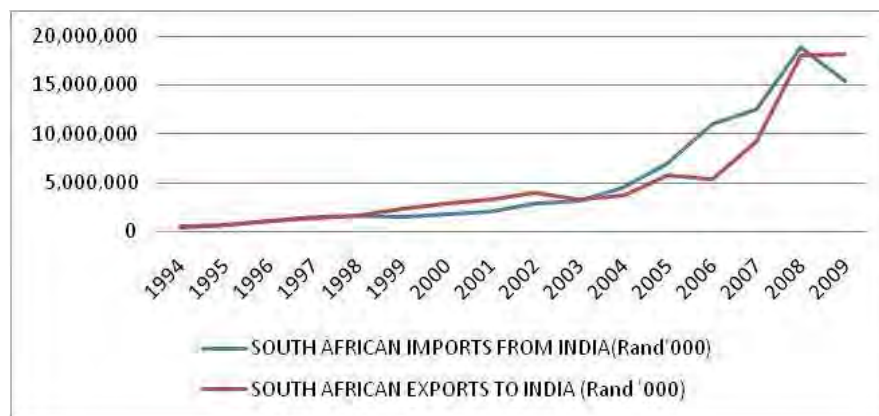
Figure 12: Bilateral trade flow between South Africa and Russia



Source: adapted from South African Reserve Bank data

### 5.2.3 India's trade profile with South Africa

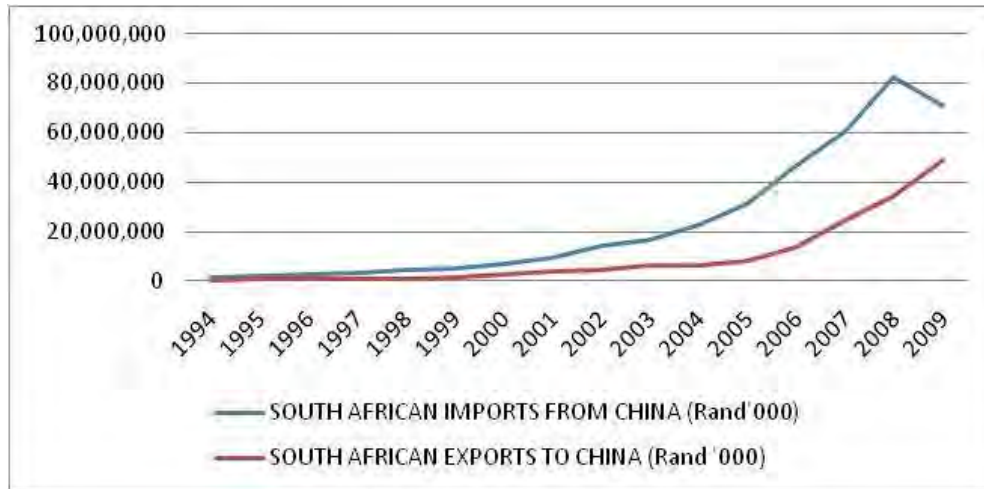
Figure 13: Bilateral trade flow between South Africa and India



Source: adapted from South African Reserve Bank data

### 5.2.4 China's trade profile with South Africa

Figure 14: Bilateral trade flow between South Africa and China



*Source: adapted from South African Reserve Bank data*

The above figures reflecting the rand value of trade between South Africa and each BRIC country shows with the exception of India South Africa is a net importer of goods from the rest of the BRIC countries. This contributes towards South Africa's widening trade deficit as shown in figure 2. Figure 13 reflects that while currently South Africa is a net exporter to India, this has only transpired since 2008.

### 5.3 Results for Proposition One and Two

#### 5.3.1 Result for Brazil

Table 1: Long Run Model Results for Brazil

Estimated Long Run Coefficients				
ARDL(1,0,0,0) selected based on Akaike Information Criterion				
Dependent variable is TBALANCE				
63 observations used for estimation from 1994Q1 to 2009Q4				
Regressor	Coefficient	Standard Error	T-Ratio[Prob]	
SAGDP	-.2352E-3	.3345E-3	-.70307[.485]	
BRAZILGDP	.019397	.0030513	6.3570[.000]	
REEX	-.0063069	.019128	-.32972[.743]	
INPT	.42683	.26367	1.6188[.111]	
Testing for existence of a level relationship among the variables in the ARDL model				
F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
6.538	3.4218	4.5753	2.8594	3.8967
W-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
26.152	13.6872	18.3011	11.4376	15.5868
<i>If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications.</i>				

Source: research output from Microfit

### 5.3.2 Result for Russia

Table 2: Long Run Model Results for Russia

Estimated Long Run Coefficients				
ARDL(1,0,0,0) selected based on Akaike Information Criterion				
Dependent variable is TBALANCE				
63 observations used for estimation from 1994Q1 to 2009Q4				
Regressor	Coefficient	Standard Error	T-Ratio[Prob]	
SAGDP	0.0067696	0.00337	2.0088[.049]	
RUSSIAGDP	-0.0002914	0.0001556	-1.8727[.066]	
REEX	0.4427	3.3964	.13034[.897]	
INPT	-2.342	2.1123	-1.1087[.272]	
Testing for existence of a level relationship among the variables in the ARDL model				
F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
8.2947	3.4193	4.5968	2.8594	3.9122
W-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
33.1786	13.6774	18.3872	11.4375	15.6488
<i>If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications.</i>				

Source: research output from Microfit



### 5.3.3 Result for India

Table 3: Long Run Model Results for India

Estimated Long Run Coefficients				
ARDL(1,1,0,0) selected based on Akaike Information Criterion				
Dependent variable is TBALANCE				
63 observations used for estimation from 1994Q1 to 2009Q4				
Regressor	Coefficient	Standard Error	T-Ratio[Prob]	
SAGDP	-1.46E-04	2.14E-04	-.68080[.499]	
INDIAGDP	1.02E-07	1.57E-07	.65195[.518]	
REEX	-0.74462	0.69452	-1.0721[.289]	
INPT	0.76763	0.30982	2.4777[.017]	
Testing for existence of a level relationship among the variables in the ARDL model				
F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
4.9537	3.4402	4.6748	2.8494	3.9435
W-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
1.7358	13.7608	18.699	11.3975	15.7739
<i>If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications.</i>				

Source: research output from Microfit

### 5.3.4 Result for China

Table 4: Long Run Model Results for China

Estimated Long Run Coefficients				
ARDL(1,1,0,0) selected based on Akaike Information Criterion				
Dependent variable is TBALANCE				
63 observations used for estimation from 1994Q1 to 2009Q4				
Regressor	Coefficient	Standard Error	T-Ratio[Prob]	
SAGDP	-0.0014518	0.0008109	-1.7904[.081]	
CHINAGDP	0.00001096	0.0002003	.054727[.957]	
REEX	0.015162	0.017348	.87399[.387]	
INPT	4.4883	0.72228	6.2141[.000]	
Testing for existence of a level relationship among the variables in the ARDL model				
F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
5.5938	3.4514	4.6872	2.854	3.9568
W-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
22.3752	13.8056	18.749	11.4159	15.827
<p><i>If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications.</i></p>				

Source: research output from Microfit

## 5.4 Results for Proposition Three

### 5.3.1 ARDL results for Brazil

Table 5: ARDL results for Brazil

Autoregressive Distributed Lag Estimates				
ARDL(1,0,0,0) selected based on Akaike Information Criterion				
Dependent variable is TBALANCE				
63 observations used for estimation from 1994Q1 to 2009Q4				
Regressor	Coefficient	Standard Error	T-Ratio[Prob]	
TBALANCE(-1)	.31731	.12984	2.4439[.018]	
SAGDP	-.1606E-3	.2269E-3	-.70761[.482]	
BRAZILGDP	.013242	.0031528	4.2002[.000]	
REEX	-.0043057	.013065	-.32956[.743]	
INPT	.29139	.18304	1.5919[.117]	
R-Squared	.82537	R-Bar-Squared	.81333	
S.E. of Regression	.57653	F-Stat. F(4,58)	68.5331[.000]	
Testing for existence of a level relationship among the variables in the ARDL model				
	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
F-statistic				
6.5380	3.4218	4.5753	2.8594	3.8967
W-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
26.1520	13.6872	18.3011	11.4376	15.5868
<p><i>If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications.</i></p>				

Source: research output from Microfit

### 5.3.2 ARDL results for Russia

Table 6: ARDL Results for Russia

Autoregressive Distributed Lag Estimates				
ARDL(1,0,0,0) selected based on Akaike Information Criterion				
Dependent variable is TBALANCE				
63 observations used for estimation from 1994Q1 to 2009Q4				
Regressor	Coefficient	Standard Error	T-Ratio[Prob]	
TBALANCE(-1)	.21431	.12737	1.6826[.098]	
SAGDP	.0053188	.0026682	1.9934[.051]	
RUSSIAGDP	-.2289E-3	.1224E-3	-1.8711[.067]	
REEX	.34783	2.6697	.13029[.897]	
INPT	-1.8401	1.6503	-1.1150[.270]	
R-Squared	0.15056	R-Bar-Squared	0.088781	
S.E. of Regression	2.4789	F-Stat. F(4,55)	2.4371[.058]	
Testing for existence of a level relationship among the variables in the ARDL model				
F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
8.2947	3.4193	4.5968	2.8594	3.9122
W-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
33.1786	13.6774	18.3872	11.4375	15.6488
<i>If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications.</i>				

Source: research output from Microfit

### 5.3.3 ARDL results for India

Table 7: ARDL Results for India

Autoregressive Distributed Lag Estimates				
ARDL(1,1,0,0) selected based on Akaike Information Criterion				
Dependent variable is TBALANCE				
63 observations used for estimation from 1994Q1 to 2009Q4				
Regressor	Coefficient	Standard Error	T-Ratio[Prob]	
TBALANCE(-1)	0.41142	0.12748	3.2272[.002]	
SAGDP	0.0071373	0.0028151	2.5354[.015]	
SAGDP(-1)	-0.0072231	0.002858	-2.5273[.015]	
INDIAGDP	6.005E-08	9.429E-08	.63688[.527]	
REEX	-0.43827	0.40578	-1.0801[.286]	
INPT	0.45182	0.19629	2.3017[.026]	
R-Squared	0.48332	R-Bar-Squared	0.42835	
S.E. of Regression	0.36048	F-Stat. F(5,47)	8.7929[.000]	
Testing for existence of a level relationship among the variables in the ARDL model				
F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
4.9537	3.4402	4.6748	2.8494	3.9435
W-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
1.7358	13.7608	18.699	11.3975	15.7739
<i>If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications.</i>				

Source: research output from Microfit

### 5.3.4 ARDL results for China

Table 8: ARDL Results for China

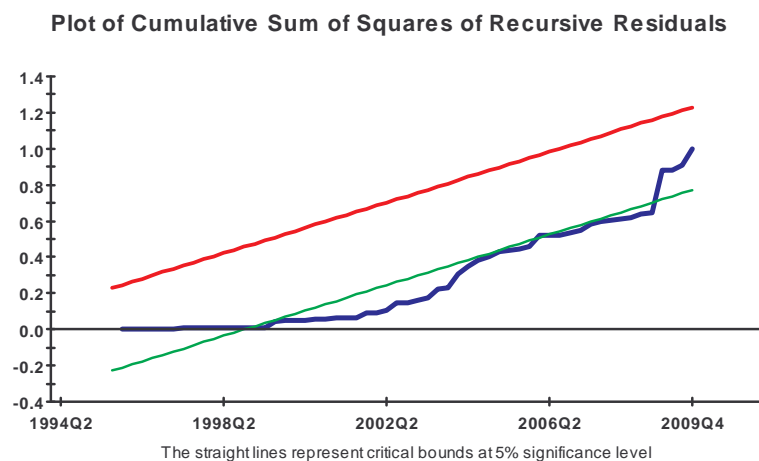
Autoregressive Distributed Lag Estimates				
ARDL(1,1,0,0) selected based on Akaike Information Criterion				
Dependent variable is TBALANCE				
63 observations used for estimation from 1994Q1 to 2009Q4				
Regressor	Coefficient	Standard Error	T-Ratio[Prob]	
TBALANCE(-1)	0.33404	0.14383	2.3224[.025]	
SAGDP	0.010889	0.0073022	1.4912[.143]	
SAGDP(-1)	-0.011856	0.0072908	-1.6261[.111]	
CHINAGDP	0.000007299	0.0001333	.054760[.957]	
REEX	0.010097	0.012028	.83951[.406]	
INPT	2.9891	0.83592	3.5758[.001]	
R-Squared	0.3338	R-Bar-Squared	0.25449	
S.E. of Regression	0.98414	F-Stat. F(5,42))	4.2089[.003]	
Testing for existence of a level relationship among the variables in the ARDL model				
F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
5.5938	3.4514	4.6872	2.854	3.9568
W-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
22.3752	13.8056	18.749	11.4159	15.827
<i>If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications.</i>				

Source: research output from Microfit

## 5.5 Test for Stability

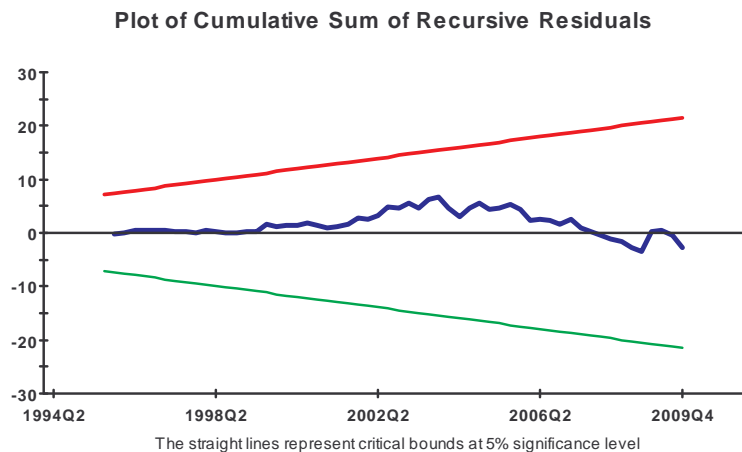
Following Bahmani-Oskooee and Bohl (2000) and Bahmani-Oskooee and Goswami (2003), as cited in Bahmani-Oskooee, Goswami and Talukar (2005), the Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) tests were used to check for stability. The CUSUM test plots the recursive residuals against the break points and the CUSUMSQ test plots the squared recursive residuals against the break points, (Bahmani-Oskooee, Goswami and Talukar, 2005). For stability, the plots must stay within the five per cent significance level portrayed by two straight lines.

Figure 15: CUSUMSQ for Brazil



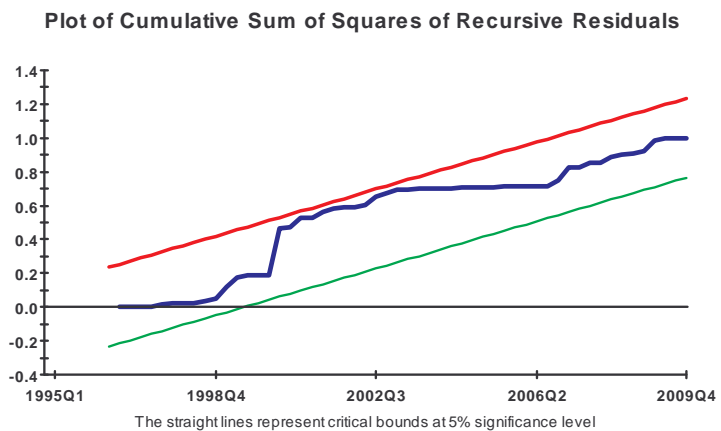
Source: research output from Microfit

Figure 16: CUMS for Brazil



Source: research output from Microfit

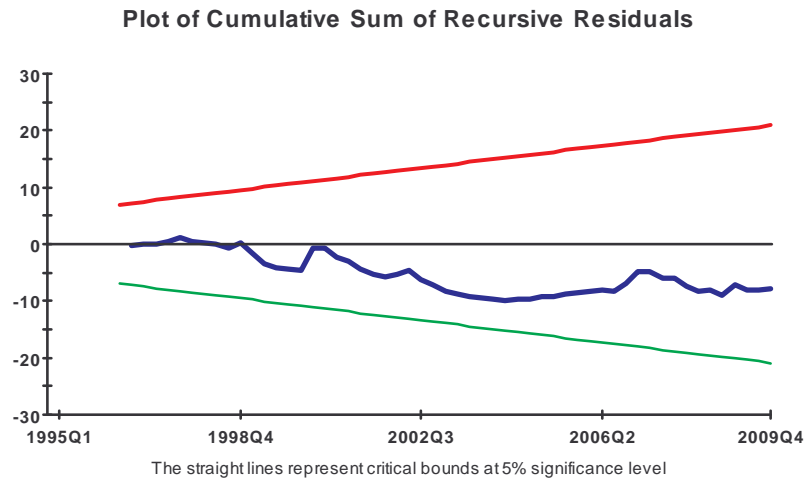
Figure 17: CUSUMSQ for Russia



Source: research output from Microfit

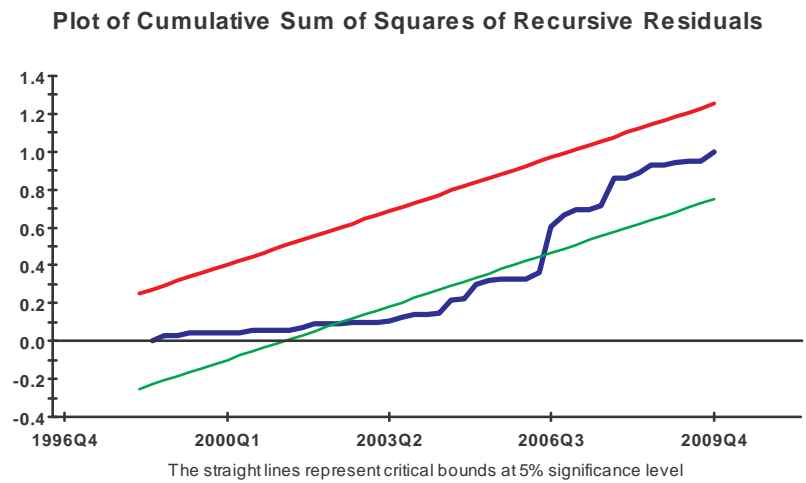


Figure 18: CUMS for Russia



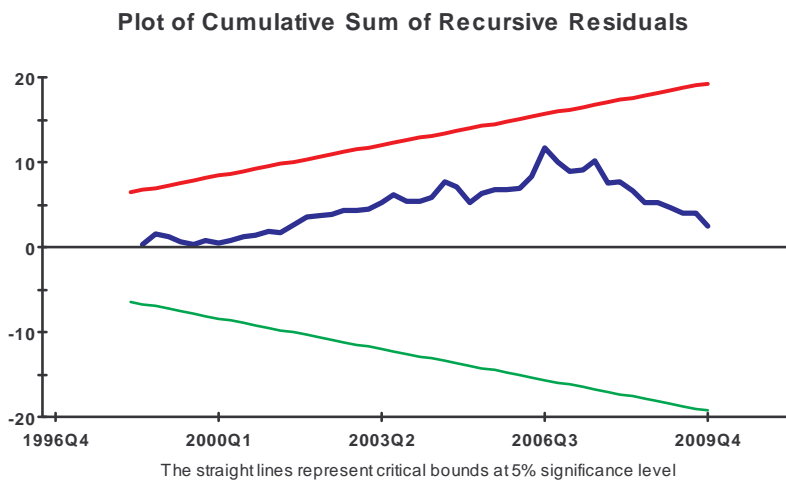
Source: research output from Microfit

Figure 19: CUSUMSQ for India



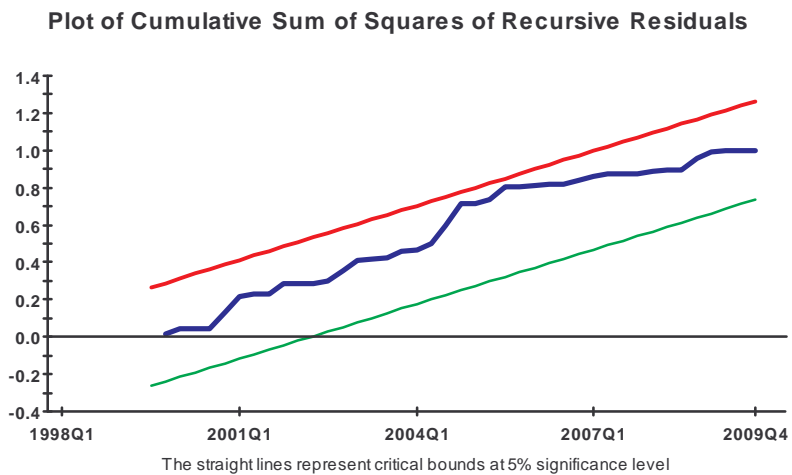
Source: research output from Microfit

Figure 20: CUMS for India



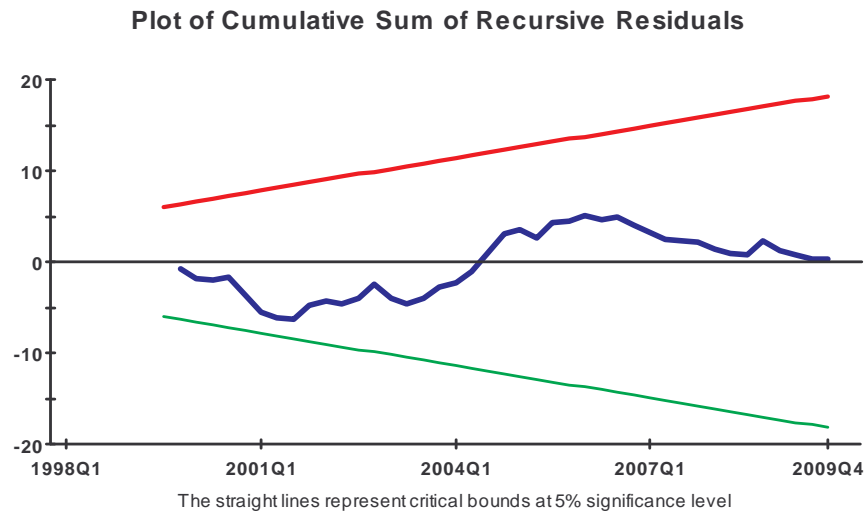
Source: research output from Microfit

Figure 21: CUSUMSQ for China



Source: research output from Microfit

Figure 22: CUMS for China



Source: research output from Microfit

## 5.6 Conclusion to Results

Chapter 5 presented the results for each of the research propositions. The bilateral trade profile between the BRIC countries and South Africa was presented. The results of the Long Run Trade Balance model and Autoregressive Distributed Lagged (ARDL) models were also shown. Finally the results of the tests for stability were presented.

In Chapter 6, the results will be discussed in more detail and are compared to the findings of past studies.

## CHAPTER 6: DISCUSSION OF RESULTS

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### 6.1 Introduction

In this chapter the research findings are discussed in more detail and are linked back to the research problem, literature and research objectives.

### 6.2 Analysis of Proposition 1

**Proposition 1: There is a direct relationship between the exchange rate of the rand and the trade balance**

According to Bahmani-Oskooee, Goswami and Talukar (2005) it is assumed that the trade balance has a positive association with South Africa's income ( $Y_a$ ) and a negative association with the income of the trading partner ( $Y_i$ ). This is based on the premise that an increase in South Africa's income is expected to stimulate the imports from the trading partners and an increase in trading partner's income is expected to increase exports to that trading partner (Bahmani-Oskooee, Goswami and Talukar, 2005).

Therefore if the estimate of  $\beta$  is positive and the estimate of  $\gamma$ , negative there is a direct relationship between the exchange rate and trade balance (Bahmani-Oskooee, Goswami and Talukar, 2005).

## Results for Proposition 1

From the results in table 1, for Brazil the value of  $\beta$  was  $-.2352E-3$  and  $\gamma$   $019397$ . According to Bahmani-Oskooee, Goswami and Talukar (2005) if a relationship between the exchange rate and trade balance exists, the estimate of  $\beta$  would be positive and the estimate of  $\gamma$ , would be negative. Based on the results of table 1 we can conclude that according to the long run model, there is no relationship between the exchange rate and the trade balance in the long run between South Africa and Brazil.

From the results in table 2, for Russia the value of  $\beta$  was  $0.0067696$  and  $\gamma$  was  $-0.00029147$ . According to Bahmani-Oskooee, Goswami and Talukar (2005) if a relationship between the exchange rate and trade balance exists, the estimate of  $\beta$  would be positive and the estimate of  $\gamma$  would be negative. Therefore we can conclude that according to the long run model, there is a relationship between the exchange rate and the trade balance in the long run between South Africa and Russia.

From the results in table 3, for India the value of  $\beta$  was  $-1.46E-04$  and  $\gamma$   $-1.02E-07$ . According to Bahmani-Oskooee, Goswami and Talukar (2005) if a relationship between the exchange and trade balance exists, the estimate of  $\beta$  would be positive and the estimate of  $\gamma$ , negative. Therefore we can conclude that according to the long run model, there is no relationship between the exchange rate and the trade balance in the long run between South Africa and India.

From the results in table 4, for China the value of  $\beta$  was -0.0014518 and  $\gamma$  0.00001096. According to Bahmani-Oskooee, Goswami and Talukar (2005) if a relationship between the exchange and trade balance exists, the estimate of  $\beta$  would be positive and the estimate of  $\gamma$ , negative. Therefore we can conclude that according to the long run model, there is no relationship between the exchange rate and the trade balance in the long run between South Africa and China.

### **Discussion of Proposition 1**

The findings of proposition 1 are supported by Wilson and Tat (2001) who concluded in their study between Singapore and the USA that there is no evidence to support the existence of a relationship between the real exchange rate and the trade balance.

Wilson and Tat (2001) believe that the trade balance is driven by external demand factors rather than price factors underpinned by the exchange rate. Wilson and Tat (2001) provided the example of Japan which was able to achieve record export growth between 1985 and 1995 despite persistent currency appreciation.

Liew, Lim and Hussain (2002) provide further support for these results and state that the role of exchange rates on impacting the trade balance has been vastly over exaggerated. In their study between Japan and the ASEAN-5 countries (Indonesia, Malaysia, Philippines, Singapore and Thailand) Liew, Limb and Hussain (2002) found no empirical evidence to support the existence of a

relationship between the exchange rate and the trade balance and proposed rather that the trade balance is affected by real money, rather than the exchange rate.

As shown from the results above that while a relationship between the exchange rate and trade balance exists between South Africa and Russia, there is no such relationship with Brazil, India and China. The implication of these findings is that should South Africa adopt any policies to manipulate the rand in a certain direction to manage the trade balance policy, the results achieved will be unpredictable (as they will vary per country) and may not lead to any improvement of the trade balance in the long term.

### **6.3 Analysis of Proposition 2**

**Proposition 2: A real devaluation of the rand will improve South Africa's trade balance**

If a real devaluation of the South African rand against the currency of its trading partners, (i.e. a decrease in the real exchange rate) is to improve the trade balance with that partner, the estimate of  $\lambda$  is expected to be positive (Bahmani-Oskooee, Goswami and Talukar, 2005).

## Results of Proposition 2

From the results in table 1, according to the ARDL model, the value of  $\lambda$  for Brazil was -0.0063069. According to Bahmani-Oskooee, Goswami and Talukar (2005) in order to conclude that a real devaluation of a country's currency would have a positive effect on the trade balance the value of  $\lambda$  should be positive. Therefore with  $\lambda$  having a value of -.0063069, it can be concluded that in the long run a real depreciation of the South African rand against Brazil's real will not improve the trade balance.

From the results in table 2, according to the ARDL model, the value of  $\lambda$  for Russia was 0.4427. According to Bahmani-Oskooee, Goswami and Talukar (2005) in order to conclude that a real devaluation of a country's currency would have a positive effect on the trade balance the value of  $\lambda$  should be positive. Therefore with  $\lambda$  having a value of 0.4427, it can be concluded that in the long run a real depreciation of the South African rand against the Russian ruble would lead to an improvement in the trade balance. By testing for the J-Curve, Proposition 3 will provide insight into what the short and long term impact could potentially be.

From the results in table 3, according to the ARDL model, the value of  $\lambda$  for India was -0.74462. According to Bahmani-Oskooee, Goswami and Talukar (2005) in order to conclude that a real devaluation of a country's currency would have a positive effect on the trade balance the value of  $\lambda$  should be positive. Therefore with  $\lambda$  having a value of -0.74462, it can be concluded that in the long



run a real depreciation of the South African rand against the Indian rupee would not improve the trade balance.

From the results in table 4, according to the ARDL model, the value of  $\lambda$  for China was 0.015162. According to Bahmani-Oskooee, Goswami and Talukar (2005) in order to conclude that a real devaluation of a country's currency would have a positive effect on the trade balance the value of  $\lambda$  should be positive. Therefore with  $\lambda$  having a value of 0.015162, it can be concluded that in the long run a real depreciation of the South African rand against the Chinese yuan would lead to an improvement in the trade balance.

The results for proposition 2 are mixed with Brazil and India showing that a real depreciation of the rand against the Brazilian and Indian currencies would not result in an improvement of South Africa's trade balance. Conversely a depreciation of the rand against the Russian and Chinese currencies would lead to an improvement of the trade balance.

## **Discussion of Proposition 2**

Although the findings of proposition 2 are mixed, it is consistent with the view of Musila and Newark (2003) who state that the empirical evidence concerning the impact of currency devaluation on the trade balance is mixed.

Musila and Newark (2003) state that the impact of an exchange rate policy on the trade balance is not clear as the nominal exchange rate is not the only variable that influences the real exchange rate.

The ambiguity of the results of proposition two are also consistent with a study between Canada and the USA conducted by Georgopoulos (2008) who concluded that while there was some improvement in the trade balance, the improvement was not statistically significant.

Georgopoulos (2008) concluded that overall both import and export volumes are unresponsive to exchange rate changes. Georgopoulos (2008) went further and investigated periods both before and after Canada joined the North American Free Trade Agreement (NAFTA) and still found that import and export volumes were unresponsive to exchange rate changes.

Musila and Newark (2003) found that currency devaluation actually worsened the trade balance in the short term and only marginally improved in the long term. According to their study it was uncertain as to whether the long term gains would actually offset the short term loss.

In a study of 19 countries done by Cooper (1971) as cited in Musila and Newark (2003), Cooper (1971) found that the trade balance improved in some cases and worsened in other cases following currency devaluation. This finding is consistent with the findings of this study.

The results of proposition 2 cannot be used on its own as although a devaluation of the rand against the Russian and Chinese currencies would lead to an improvement in the trade balance, the model does not infer the significance of the improvement. Using the ARDL model, proposition 3 will attempt to define

the impact of a devaluation of the rand on the trade balance in the short and long term by estimating the J-Curve effect.

#### **6.4 Analysis of Proposition 3**

**Proposition 3: By devaluing the rand, the South African trade balance will reflect the J-Curve effect**

If the calculated F-statistic for joint significance from the ARDL model is greater than the critical value of 4.01 at the 5% level of significance then cointegration amongst the variables exist (Bahmani-Oskooee, Goswami and Talukar, 2005). Once cointegration has been established the J-curve effect can be assessed by the sign and size of estimates of  $\lambda$ .

#### **Results for Proposition 3**

From table 5, the calculated F-statistic for Brazil was 6.5380 which is greater than the critical value of 4.01. Therefore we can conclude that there is cointegration amongst the variables. Table 5 also shows that the optimal lag length was determined to be zero. The J-curve effect cannot be inferred with a zero lag and it can therefore be concluded that there is no J-Curve effect between South Africa and Brazil.

The results of proposition 3 are consistent with the results of propositions 1 and 2 for Brazil, and it can be concluded that there will be no impact on South

Africa's trade balance with Brazil should there be a change of South Africa's exchange rate regime.

The results of propositions 1 and 2 for Russia was shown to be consistent proving that there is a relationship between the exchange rate and trade balance between South Africa and Russia. Furthermore the results showed that a devaluation of the rand against the ruble would have a positive effect on the trade balance in the long run. In order to quantify the short term and long term responsiveness of the trade balance to exchange rate, proposition 3 tests for the J-Curve effect.

From table 6, the calculated F-statistic for Russia was 8.2947 which is greater than the critical value of 4.01. Therefore we can conclude that there is cointegration amongst the variables. Table 5 also shows that the optimal lag length was determined to be zero. The J-curve effect cannot be inferred with a zero lag and it can therefore be concluded that there is no J-Curve effect between South Africa and Russia.

Therefore the conclusion is that while a devaluation of the South African rand against the Russian ruble would have a positive effect on the trade balance in the long term, this effect is not consistent with J-Curve.

From table 6, the calculated F-statistic for India is 4.9537 which is greater than the critical value of 4.01. Therefore we can conclude that there is cointegration amongst the variables. Table 5 also shows that the optimal lag length was

determined to be zero. The J-curve effect cannot be inferred with a zero lag and it can therefore be concluded that there is no J-Curve effect between South Africa and India.

The results of proposition 3 are consistent with the results of propositions 1 and 2 for India, and it can be concluded that there will be no impact on the South Africa's trade balance with India should there be a change in South Africa's exchange rate regime.

The results of propositions 1 and 2 for China was shown not to be consistent. Therefore to make a final conclusion the results of the ARDL model of proposition 3 will be used. While the results of proposition 2 found that a devaluation of the rand against the Chinese yuan would lead to an improvement of the trade balance, the model does not infer any statistical significance. By using the ARDL model to determine if the J-curve effect exists between China and South Africa a final conclusion can be made.

From table 8, the calculated F-statistic for China was 5.5938 which is greater than the critical value of 4.01. Therefore we can conclude that there is cointegration amongst the variables. Table 5 also shows that the optimal lag length was determined to be zero. The J-curve effect cannot be inferred with a zero lag and it can therefore be concluded that there is no J-Curve effect between South Africa and China.

The results for China are interesting and somewhat ambiguous, as while there is no direct relationship between the exchange rate and trade balance (proposition 1), a devaluation of the rand would lead to an improvement of the trade balance with China. However these ambiguous results are consistent with the findings of Bahmani-Oskooee and Wang, (2008) who state that the response of China's trade balance to changes in the did not provide not much support for the J-curve effect in the short-run and no favourable effect in the long run.

### **6.5 Analysis of Tests for Stability**

Following the approach of Bahmani-Oskooee, Goswami and Talukar (2005) the CUSUM and CUSUMSQ tests were used to check for stability. While a hint of instability is noted in figure 15 for Brazil and in figure 19 for India on the CUSUMSQ test, there is no instability noted in the CUSUM test for any of the BRIC countries. Therefore according to Bahmani-Oskooee, Goswami and Talukar (2005) in this situation we can rely only on the CUSUM test and therefore there is no instability noted in any of the cases.

## 6.6 Summary of Results

Table 9: Summary of results

	<b>Proposition One</b> Direct relationship between the exchange rate and trade balance	<b>Proposition Two</b> Devaluation will lead to improvement of the trade balance	<b>Proposition Three</b> J-Curve Present
Brazil	No	No	No
Russia	Yes	Yes	No
India	No	No	No
China	No	Yes	No

## 6.7 Conclusion

In summary based on the analysis above the conclusion is that a devaluation of the rand will not necessarily lead to a long term improvement of the trade balance. Furthermore the outcome of a devaluation of the will not be uniform amongst South Africa's trading partners as the results show that the outcome is specific to each country.

The analysis in this section has not taken the risk of domestic inflation into regard which could result from the devaluation in the external value of the rand as was the case in South Africa in 2001/2. Such an inflationary effect might limit the export opportunities derived from currency depreciation, as it will increase the cost of domestic production and therefore the cost of South African exports.

Such possible inflationary effects might in their own right impact on any J-Curve development, but is nevertheless outside the scope of this research.

## CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

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### 7.1 Introduction

In this chapter the main findings of the research are highlighted. Based on the results presented in Chapter 5 and the discussion in Chapter 6, the implications to South African policy are discussed and recommendations are made to address the proposals being made by the trade unions.

### 7.2 Research Findings

- There is no relationship between the exchange rate and the trade balance between South Africa and Brazil, India and China. Russia was the exception and according to the long term model (equation 1) there is a relationship between the trade balance and exchange rate between South Africa and Russia.
- A devaluation of the rand with no consequent devaluation by the BRIC countries would lead to an improvement of the trade balance for trades between South Africa and Russia and South Africa and China. The results for Russia were consistent, however the findings for China was somewhat unexpected. While a relationship exists between the exchange rate and trade balance for China, a depreciation of the rand would not lead to an improvement of the trade balance.
- The results for testing for the J-curve was all negative, i.e. following a devaluations of the rand there would be no initial worsening of the trade



balance in the short term and neither would there be any improvement of the trade balance in the long run.

- The overall conclusion of this study is that a devaluation of the rand will not lead to a long term improvement of the trade balance and the outcome of the devaluation would not be uniform amongst South Africa's trading partners.

### **7.3 Implications of Research Findings**

The findings of this research do not support the notion that by devaluing the rand South Africa's export sector would significantly improve. This principle is supported by Yusof (2009), who states that while currency depreciation would theoretically encourage exports and discourage imports the statistical evidence to confirm this is inconclusive.

Musila and Newark (2003) state that one of the reasons why the relationship between the exchange rate and the trade balance is not clear, is that the exchange rate is just one of the variables that could have an impact on the trade balance. Therefore the calls by COSATU for government to intervene and weaken the rand is misdirected, as the exchange rate is just one of the factors that government needs to take into consideration in its economic policy. Furthermore the calls by COSATU have not taken into account the inflationary pressures that could result from a devaluation of the rand or the fact that the outcome would not be uniform amongst South Africa's trading partners.

Finally no consideration was made for any possible counter measures to be taken by South Africa's trading partners in response to a devaluation of the rand.

#### **7.4 Recommendations to policy makers**

According to South Africa's Finance Minister Pravin Gordhan, in his 2010 medium term budget policy statement, the goal of the South African government was to accelerate the growth of the economy, reduce poverty, unemployment and inequality. In 2009 South Africa's GDP contracted by 1.9 percent and there was approximately one million jobs lost (Gordhan, 2010). Inflation had declined to 3.5 percent and it is expected to remain below 6 percent until 2013 (Gordhan, 2010).

From December 2009 to October 2010, the rand appreciated by 6.6 percent against the US dollar, and by 5.5 per cent against the currencies of South Africa's major trading partners (Gordhan, 2010).

The following recommendations are made based on the work of Stučka (2004) who suggested that besides devaluing the currency the government could implement supply side policies such as:

- influencing labour productivity or wages by curbing inflation or decreasing taxes
- relaxing rigid labour market conditions;
- incentivising companies to invest in South Africa;
- implementing tax measures to counter the effects of currency appreciation.

Furthermore South Africa has a comparatively high interest rate (compared to the interest rate levels in developed economies) which has resulted in huge capital inflows. This has been noted as one of the factors that led to the appreciation of the rand in 2010 (Gordhan, 2010). As inflation is comfortably within South Africa's target band, the government could consider reducing interest rates as a mechanism to help stimulate the economy by reducing the cost of borrowing. This would also have an indirect effect on the exchange rate.

### **7.5 Recommendations for further research**

According to Bahmani-Oskooee and Wang (2008) one of the limitations of time series econometric analysis is that it does not explain what happens during specific currency devaluation or appreciation episodes. Therefore alternative approaches to test for the exchange rate/trade balance relationship could yield different results and provide further insights into the exchange rate/trade balance relationship.

The J-Curve effect could be further tested according to specific industry sectors and not just aggregated data at a country level (Bahmani-Oskooee and Wang, 2008).

While the results of this research show that with Russia, a devaluation of the rand would improve the trade balance; further research is needed to determine what the possible inflationary impacts could be, and whether the benefits of an improved of the trade balance would outweigh the inflationary impact.

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